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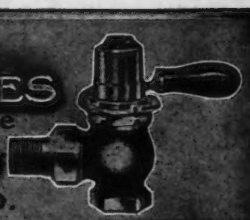

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The Enemy Is Watching

By **NEWTON D. BAKER,** *Secretary of War*

The supreme moments of our struggle with Germany have now come.

We have carried our first armies across three thousand miles of ocean and joined the issue of battle with the military power of a nation that has been for forty years preparing its plans and its weapons for its present attempt to dominate the world. We have had to put forth an immense effort and spend a fabulous sum in order to make, in so short a time, an adequate beginning for our gigantic task.

But it is only our beginning. We must follow it with greater energy and support it with increasing power. Men, munitions, ships and supplies must go to Europe in a larger and larger stream. We must redouble our blows and add constantly to the strength of those blows, if our initial effort is not to be wasted.

This Means That Our Fourth Liberty Loan Must Be Larger Than Its Predecessors, More Enthusiastically Supported and More Quickly Than Ever Subscribed

The enemy is watching anxiously for the first sign that we are faltering.

Our Government Loans should go "over the top" as eagerly as our soldiers do, in order to carry with them the terror of furious attack. Our dollars must rain upon the enemy as overwhelmingly as our hail of bullets or our storm of shells.

We are fighting for the liberty of the world, for the triumph of our ideals of democracy and self-government over the last great advocate of force upholding injustice. We are buying with our Liberty Loans the security and joy of our people for generations to come. No price could be too high to pay for such a victory—no cost too great for such a purchase.

Lend the Way Our Boys Fight—To Your Very Utmost!

This Space Contributed to Winning the War by

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NEW YORK CLEVELAND CHICAGO BOSTON

THE HEATING AND VENTILATING MAGAZINE

Cooperstown, N. Y. October, 1918 1123 Broadway, New York

THE "PHILADELPHIA PLAN" OF COAL ALLOTMENT

How the Heating Trade in Philadelphia Successfully Co-Operated with the Fuel Administration in Developing a Highly-Successful Scheme of Fuel Distribution.

By JEROME S. CARSON,

Federal Fuel Administration for Philadelphia.

EDITOR'S NOTE.—*The plan described in the following article was devised before the coal shortage became so serious as to bring up the question of a possible limiting of the supply. As worked out, the p'an is intended to be permissive, so that it may be adopted by any municipa'ity or section with the approval of the State Fuel Administrator.*

Manufacturers and designers of heating and range apparatus, working in co-operation with the United States Fuel Administration and the Philadelphia Fuel Administration have been so successful in working out a plan for supervised distribution of domestic anthracite coal, and putting it into practical operation, that the scheme has become widely known as "the Philadelphia plan." In Philadelphia, it has not only prevented the wasteful use of coal but has resulted in a great saving. For this reason efforts are now being made to have the scheme nationalized.

Cities in the eastern part of the country are now beginning to adopt it and it is expected that the system will be extended to many cities in the west. It has received the endorsement of the United States Fuel Administration at Washington.

The distribution system was devised as the result of the abnormal conditions brought about during the domestic coal shortage last winter. When consumers learned that there was a lack of coal they besieged their dealers, which resulted in many retailers closing their offices. Riots occurred in some sections of Philadelphia when the crowds were refused admittance to the coal dealers' offices.

Similar conditions were prevalent in other cities at the same time. In Philadelphia, however, City Fuel Administrator Francis A. Lewis decided that quick action was necessary. He showed his business and professional qualities by calling into consultation, Thomas C. Mahady, a Philadelphia fuel and heating engineer, of the United States Radiator Corporation. After every detail of the situation was talked over, Mr. Mahady and Fuel Administrator Lewis decided that those who designed and manufactured heaters and ranges were the proper persons to handle the domestic conservation problems.

Fuel Administrator Lewis then ap-

pointed Mr. Mahady his assistant. He was given charge of the work of bringing about a conservation of coal that would afford the necessary relief to the city.

One of Mr. Mahady's first acts was to call a meeting of all designers and manufacturers of heating apparatus. He outlined a plan of conservation, the principles of which are now embodied in most conservation measures. Those who attended the meeting offered their services to the Government without remuneration, and to this day these men are serving without pay.

A number of sessions were held by the heating experts in the Adelphia Hotel, Philadelphia, and it was only a short time before concrete plans were formed. The manufacturers offered and gave the financial assistance that was necessary.

OPENING OF CONSERVATION STATIONS.

Actual work began in December, 1917. "Conservation stations," were opened in every section of the city. In most cases they were established in stores in order to afford easy access from the street and also to provide window displays. The use of these stores was donated by the owners. At first there were about fifteen of them, but this number increased when the original stations became overcrowded. Some of them had such a large attendance it was necessary for policemen to keep the people in line at the door. During the twelve days they were open they had a total attendance of 151,412.

Instructors for the conservation stations were chosen from among the volunteers from the heating manufacturing industry. Three instructors were allotted to each conservation station and they worked in relays. The stations opened during the day and remained open until late at night.

HEATING PROBLEMS EXPLAINED TO THE PUBLIC.

Instruction was based on scientific and practical operation of household heating apparatus. There was no heating problem that was not taken up. To these stations came men and women whose homes contained every possible type of heating and cooking apparatus. They brought their complaints, each of which was gone over thoroughly by the instructors and the people were able to go home and remedy their troubles. Persons from all walks of life took advantage of the opportunity. Presidents

THE WAY INSTRUCTION TALKS WERE GIVEN IN THE "CONSERVATION STATIONS."

of big corporations, United States Government officials, bankers, etc. were among them. Everybody praised the system of instruction.

Colored charts, 5 x 20 ft. were used to illustrate the instructions. They contained standard types of boilers, furnaces, stoves and radiators and their parts. No particular make of apparatus was shown, the illustrations being a combination of all.

The moment the instructors entered the stations they lost their identity as far as their business connections were concerned. They were not permitted to suggest any type or make of heating apparatus. Notices to this effect were posted in all the instruction stations and the visitors were told to refrain from asking such information. One of the reasons for this was that the instruction stations were established for the purpose of conserving coal by correcting the methods of persons who did not know how to operate their heating apparatus efficiently.

The talks given at the instruction stations were on such subjects as "Why Instruction Stations Were Established," "How Coal is Wasted and How this Waste Can Be Stopped," "Best and Most Economical Kind of Fire," "Proper Use of Check and Draft Dampers," "Cleaning of Boilers and Furnaces," "Improper Air Leakage Around Boiler, Furnace or Chimney," "Why Fires Need Fresh Air to Burn Properly," "Conditions in Parts of House Other than Cellar Where Coal is Wasted Due to Loose Windows, etc." and "General Instructions for Care of Steam Boilers, Etc."

In addition to and supplementing these talks instruction cards were handed out, containing simple rules in printed form for operating various types of heaters. The public was asked to hang these cards in a conspicuous place near the boiler or heater in the cellar and see to it that the instructions were carried out.

HOW FUEL ALLOTMENTS WERE DECIDED UPON.

In addition to the instruction cards, the consumers also received postal cards which contained a number of questions regarding the size and location of their homes and the type of heating apparatus used. They were told that if they wanted information as to how to reduce their coal consumption they should answer the questions and return the postal cards to the City Fuel Administration. This resulted in 62,196 answers being received from every section of the city and suburbs. The cards gave information concerning homes in almost every city block.

One of the good features of these answers was the fact that each person who replied was interested in cutting down the use of coal. They could, therefore, be classed as the honest consumers who wanted to assist the Fuel Administration in its conservation work. This was the first information of this kind that the Fuel Administration had received and it was indeed important.

All of the cards were turned over to Mr. Mahady. In cases where there was undoubtedly a big waste of coal, men who had acted as instructors at the conservation stations were sent to make an investigation and they advised the consumers as to the cause of their trouble. This resulted in additional important information being obtained.

Then Mr. Mahady called a meeting of his advisory council of heating and range apparatus manufacturers and designers. They went over all the information contained on returned postal

Name E A Savade
Address 5424 Larchwood Ave
State Whether Residence, Store or Apartment Building
Detached ____ Twin ____ Inside Apartment ____ Corner ____
(STATE NUMBER)
Number of Rooms 7 Is Porch Heated? Yes
State Kind of Heating, whether Vapor ____ Steam ____ Hot Water ✓
Warm-Air Furnace ____
Do You Use Coal Range? Yes
Total Number of Tons of Coal Burned Per Year 7
If you are interested in learning how to reduce your coal bill, mail this card at once to the Federal Fuel Administration for Philadelphia.
NOTE. This does not require stamp—Drop in nearest letter box.

POSTAL CARD FORM TO BE FILLED OUT BY CONSUMERS.

cards and that which had been obtained by the other methods. As the result of this they worked out a standard schedule of tonnage allotment, which has since been applicable to every house in the city, and which has been adopted by other cities which have placed the system of conservation and distribution into effect.

This was done scientifically; first, on a basis of the number of square feet of grate surface installed; second, by actually measuring the cubic contents of standard rooms, the window surface and exposed walls, and third, the number of square feet of heating surface installed.

SUPERVISED DISTRIBUTION SYSTEM.

After the allotment standard was worked out, the problem of putting it into practical operation presented itself. This proved to be almost as big a task as the problems leading up to it. But after working over the subject for some days, a system was devised that fitted perfectly.

The plan was simple in operation. There were no unnecessary details, as the result of which it is possible to ascertain, without delay, whether or not consumer have ordered more coal than they actually need.

If the war lasts any length of time this system will be extremely simple after the first year. All the facts regarding the coal supply in every house in each city adopting it will be on file and the second year will require very little expert help. In fact, nearly every householder will have recognized the amount of coal he can get and will not attempt to order any more. This will result in a conservation throughout the United States which will be so large that it will be beyond the greatest expectations in the beginning.

The first step is taken by the consumer in obtaining from his dealer two order blanks, which are supplied to the retailers by a bureau of distribution. The bureau of distribution is the headquarters of the distribution system, and in most cases is located in a building near the City Fuel Administration offices.

The forms contain questions regarding amount of coal to be used and the description of the house to be heated. They must be filled out alike, signed by the consumer, and returned to the retailer. One of these the retailer retains for his own file. The other he sends to the bureau of distribution.

The dealer is not allowed to fill the order until three days have elapsed. If, at the end of three days, he has not been advised by the bureau to cancel the order, or to reduce the quantity ordered, he can fill the order complete, if it does not call for over six tons. If more than six tons the dealer is not permitted to deliver more than two-thirds of the amount asked for. When he has a surplus of coal in his yard

House No. 2315 | Street Greene Street | Ward 15

Dealer's No | Name W K. Kripps

Date 4/15/18 | Order for 12 tons Hunted Store coal

tons coal

By chute, basket, wheelbarrow? chute Terms cash

When to deliver before Sept 1st

The following questions must be answered fully and truthfully

1. How much coal have you on hand now? None
2. How is building occupied?—as dwelling, store and dwelling, apartment building, office building, or what? Dwelling
3. Is building detached, twin, inside, or corner? Inside
4. How many rooms in it? 12 Is porch heated? No
5. Is building heated by vapor, steam, hot water, hot air, stoves? Hot Air
6. Is coal range used? No
7. Average number tons used per year? 12
8. Number of tons used last year, April to April? 12

I hereby certify that the above answers are true to the best of my knowledge and belief. And it is understood that this order is accepted subject to all rulings of the Fuel Administration, and to the ability of the dealer to furnish the coal, and the price is to be the government price at the date of delivery.

Name W K. Kripps

Address 2315 Greene St.

Dealer's name Geo B Newton Coal

Address 23rd & Arch Streets

The order in this form is required by the Fuel Administration.
It must be made in duplicate and both copies given to the dealer.
No other form of order will be recognized by the Administration, nor will dealers furnish egg, stove, nut, or pea coal, in lots of one half ton or more, in any other manner. Any false statement or violation will subject the offender to a penalty of $5000 fine or 2 years imprisonment or both.

TYPICAL COAL ORDER FORM SUPPLIED TO RETAILERS BY BUREAU OF DISTRIBUTION.

and has no unfilled orders, he can begin to deliver the remaining one-third portions of his orders.

This restriction applies particularly to the summer months when the price of coal is lower than during the winter. It gives every consumer a chance to get part of his supply at the lower price and is an incentive to order coal early.

Another good point in connection with the three-day grace period is to give the bureau of distribution a chance to check up on the orders with the standard of allotment, which is the most important part of the work.

CHECKING UP ORDERS.

Dealers mail orders to the bureau every day. Each dealer has a number which must be stamped or written on the orders.

When the orders are received at the bureau, they are checked and then sorted by wards or districts, numbers or names of which must be shown on the order forms. After this sorting they are ready for posting to cards.

When the first order is received from each house in the city, a "master card" is made out for that address and the information on the order transcribed onto the card. The cards are 8 x 5 in. Where there is a sufficient number of houses and buildings in a city to warrant it, the cards are kept in sitting record desks. If there are not a large number of houses in the town, cards can be kept in trays or cases.

In large cities double desks are provided for each 20,000 cards. In some cities it is not advisable to arrange cards by wards, due to the fact that they have irregular boundaries, which necessitates special checking and reference to a map to see whether the proper ward number has been given. After the system has been in use a short time the work can be distributed evenly among the posting clerks by allotting certain sections to each clerk.

Regardless of the guiding arrangement, the cards are filed by streets, then by house numbers. Usually the cards for the even number side of the street are filed together, then the cards follow for the odd numbered side of the same street. The posting clerk sorts the orders by streets, then by odd and even numbers, then numerically. The orders are then posted. The clerk, who must know the distribution system thoroughly, checks each posting to ascertain if the coal ordered, plus coal previously ordered, will exceed the allotment. Answers to the questions are noted and then the order put under one of the several types of buildings to which it belongs.

BUILDINGS DIVIDED INTO THREE TYPES, EACH WITH THREE CLASSIFICATIONS.

There are three types: inside, corner or twin and detached. Also there are three classifications: ordinary dwellings having about six rooms; middle-size dwellings with wide rooms and high ceilings, and large houses such as mansions. In Philadelphia there are 438,000 houses, each of which has been put into one of these classes.

After the orders are classified the allotment standard is applied. It only takes a moment for the experienced clerk to decide how much coal each house is allowed.

Another idea of how the system is worked can be obtained by taking for example, a bona-fide order for fifteen tons of coal. If the tenant had three tons of coal left from last year and his new order called for twelve tons, it would be posted and passed on. If, however, the order showed three tons on hand and called for fifteen more, the dealer would be notified by postal card to hold up the order. The manager of the bureau or one of his assistants would then notify the dealer by letter as to number of tons his customer could have.

If the consumer is not satisfied with his allotment he can appeal the decision to the domestic fuel engineer, who then usually sends out an inspector

UNITED STATES FUEL ADMINISTRATION

FRANCIS A. LEWIS

FEDERAL FUEL ADMINISTRATOR FOR PHILADELPHIA

705 MEDICAL ARTS BUILDING
16TH AND WALNUT STREETS
PHILADELPHIA

QUESTIONNAIRE

Notice: No orders for coal will be approved by the Federal Fuel Administrator if this Questionnaire is not returned with the proper information supplied, within seven days from date.

Not to be answered by consumer.

No..... Name of firm or individual.....

Date sent..... Address..... Ward No.....

Date due..... Zone No.....

Priority Status..... Dealer's No..... Type of plant..... Inspec. No.....

It is suggested that you obtain the services of a competent heating contractor or engineer to assist you in furnishing accurate information to questions asked, providing you have not a technically trained man in your employ.

SERIES I. GENERAL

(NOTE. Do not check but write in answer to each question.)

1. Is building store and apartments, church, apartment house, theatre, manufacturing plant, office building, saloon, apartments above saloon, hotel, restaurant, loft building, bank, hospital, school, brewery, green-house, public or private, or what?.....
2. Is building detached, twin, inside or corner?.....
3. Do people live and sleep in building?.....
4. How many people make their homes in building?.....
5. How long have they been occupants of building?.....
6. State number of rooms in building that are heated.....
7. If apartment house, state number of apartments and average number of rooms in each apartment, not including halls.....
8. State number of porches that are heated.....
9. Are apartments heated from heating plant which heats other portions of building?.....
10. Can living apartments be heated without heating other portions of the building?.....
11. Do you have a sprinkler system in your building?.....
12. If store or restaurant with living quarters above, state dimensions of store or restaurant.....
13. State total number of rooms used as living quarters.....

PRIORITY STATUS

1. Are you considered a public utility?.....
2. Are you a hospital or charitable institution?.....
3. Are you working on Government contracts?.....
4. Specify contract numbers and proper department.....
5. Are contracts direct with the Government or are they sub-contracts?.....
6. What percentage of your total production is Government work?.....

7. Is any portion of your building devoted to this work?
8. If so, state what portion and material contracted for
9. Is any part of your building occupied by any branch of the Federal, State or Municipal Government?
10. Is any part of your building occupied by any organization similar to the Red Cross, doing war work?
11. Do you handle perishable food or food necessary for immediate consumption?
12. Describe briefly the nature of your business
13. What size of coal do you believe best adapted to your plant?
14. How much coal had you on hand April 1st?
15. How much coal have you received since April 1st?
16. State your daily coal consumption
17. State your yearly consumption
18. Do you consider your plant efficient?
19. Give your regular coal dealer's name and address
20. How long have you been his customer?

SERIES II. CONSTRUCTION OF BUILDING

1. How many years has your building been erected?
2. State accurately the length, width and height of your building
3. State the number of stories
4. Is building of frame, brick, stone, marble, sandstone, hollow tile, steel sash and glass, sheet iron or corrugated iron?
5. How many walls are exposed?
6. How many North South East West

(By exposed walls is meant outside walls exposed to weather.)

7. Give average size and number of windows in entire building
8. Are windows single or double glass?
9. Are windows weather stripped?
10. If so, in what manner?
11. Do you use metal weatherstripping?
12. State average size and number of doors leading to outside
13. How many skylights in roof?
14. State average size of skylights
15. Are walls of ordinary overlapping clapboards?
16. Are they lathed and plastered inside?
17. If walls are brick, stone or hollow tile, state thickness
18. Are they furred and plastered inside?
19. Are walls plastered outside?
20. If building is of steel sash and glass or reinforced concrete, state architect by whom building was designed

SERIES III. TEMPERATURE

1. Do you use temperature control?
2. If so, what type?

3. What temperature do you maintain in rooms occupied as living quarters?
4. If factory, state what temperature you maintain
5. What facilities have you for obtaining a record of temperature maintained throughout day and night?

6 If any recording instrument is used, so state
7. Do you maintain room thermometers throughout your building?
8. Is building heated in day time only?
9. Is building heated only intermittently?

SERIES IV. CONSTRUCTION OF HEATING PLANT

1. Is your heating plant, steam, hot water, vapor, warm air, or purchased from central plant?
2. How often do you clean heater, flues and pipe?
3. Have they been cleaned since April 1st?
4. Do you sift your ashes?

DIVISION I. STEAM, HOT WATER AND VAPOR

1. Is it a direct or indirect steam system?
2. Note. By indirect system is meant a combined heating and ventilating system using fan to force air through heated coils and thence into rooms through ducts or by means of fresh air intake through heated coils
3. Is boiler and cellar piping covered with asbestos?
4. Do you have trouble on account of bad draft conditions?
5. Is your plant in first-class condition?
6. State name of manufacturer of boiler or boilers
7. How many boilers?
8. State size number of boiler (usually found on front of boiler)
9. State rated capacity of each boiler
10. Is boiler round, square or oblong?
11. State accurately the dimensions or area of grate. (This is important. Don't guess at it. Measure it.)
12. Is boiler equipped with grates capable of burning small sizes of coal?
13. How many square feet of radiation in building (not including piping)
14. Is your heating plant known as a one-pipe, two-pipe system, or a one-pipe system with air line?
15. If vapor or vacuum is used as a heating medium, state name of manufacturer of system installed
16. What pressure is necessary to maintain at boiler in order to heat building?
17. Do you find that some radiators are only heated partially?
18. Do you attempt to adjust air valves to relieve condition?
19. Is it difficult to keep the building comfortable in severe weather?
20. Does it require some time to get building warm in morning?
21. State approximate time
22. Do you urge tenants to turn off radiators when apartment becomes too warm instead of opening windows?

DIVISION II. WARM AIR FURNACES

1. State size number of heater and name of manufacturer
2. State dimensions or area of grate
3. State diameter of smoke pipe
4. Is furnace round or oblong with brick setting?

5. Are pipes and furnace in basement covered with asbestos? .....
6. State number of pipes leaving heater .....
7. State diameter of pipes .....
8. Is a fresh air intake from the outside used? .....
9. Give its dimensions .....
10. Is it equipped with a damper which will cut down cold air supply? .....
11. If fresh air intake is not used, how do you provide air supply? .....

DIVISION III. TANK HEATERS AND LAUNDRY STOVES

1. State size number and name of manufacturer of tank heater or laundry stove .....
2. State dimensions or area of grate .....
3. State capacity in gallons or dimensions of domestic boiler or storage tank .....
4. State total number of bathrooms in building .....
5. How many months per year is tank heater used? .....
6. If you use a laundry dryer in addition to tank heater, state number of families using same .....
7. Do you have a gas water heater? .....

DIVISION IV. COAL RANGES

1. State size number and name of manufacturer of coal range .....
2. State dimensions of fire box .....
3. Has it more than one fire box? .....
4. How many ranges do you use? .....
5. How many months per year do you use range? .....
6. Is hot water for use throughout the house heated from range? .....
7. If restaurant, hotel, boarding house or public dining room, state average number of meals (not persons) served daily .....

(Example: Two meals per day for twelve persons makes a total of 24 meals.)

DIVISION V. COAL STOVES FOR HEATING

1. State number of stoves used .....
2. Why do you use stoves to heat your building? .....

I hereby certify that to the best of my knowledge and belief the above questions have been answered truthfully and without intent to furnish misleading information.

I hereby further certify that the amount of coal used last year as stated in Series 1, Div. II, question 17 is correct to the best of my knowledge and belief, being based upon a thorough investigation of coal receipts by me personally.

.....

Signature of owner or properly designated officer of Company.

Your coal allotment will be made on the basis of information herewith furnished. The importance of accurate answers to questions is therefore emphasized. This report will be followed by a rigid inspection of your heating equipment with a verification of answers to above questions. You are urged to put this equipment in proper condition. Coal allotment will be made first to those who consume it most economically. Wasteful, inefficient plants will have their allotments based on the tonnage necessary if plants were in proper condition.

Francis A. Lewis.

Federal Fuel Administrator for Philadelphia.

to make an investigation or survey. Upon receipt of the report the domestic fuel engineer decides whether or not the allotment was correct and gives his decision to the bureau of distribution. This is final and binding. Although orders for 2,000,000 tons have been passed upon this year, there have only been 97 appeals.

All orders for commercial buildings, such as factories, theatres, department stores, office buildings, apartments, etc., where domestic sizes of anthracite are used in any quantity, are turned over to the head of the commercial department. Surveys are made in each case and suitable allotments granted. Such investigations often disclose the fact that large buildings have been burning domestic sizes of anthracite when they could have used steam sizes or soft coal. In such cases recommendations are made which not only result in a saving to the consumer but provide more coal for domestic consumption.

VALUABLE STATISTICS OBTAINED.

After the postings are completed the orders can be tabulated to ascertain the number of tons ordered each day, number of tons released for delivery, the amount of coal saved by cutting down excessive orders, number of tons ordered by dealers, classes, amount of each size and period at which the demand by consumers was greatest. At the end of the coal year the Fuel Administrator in each city using the system will know exactly how many tons were used, whether or not there has been an increase or decrease in consumption and he can figure how much he will need in his allotment for the ensuing year. With this information at hand, the big problems in the coal situation during the war will be minimized. But it must be remembered that the distribution system has not been devised only to obtain statistics. Its principal object is to conserve coal by cutting down excessive orders and preventing hoarding.

ORGANIZING INSPECTORS.

Through the adoption of the distribution system it became necessary to have inspectors. The desirable men to carry out this work were those who were familiar with low-pressure heating plants, and who possessed sufficient education to impart their knowledge to others. The logical men were salesmen of heating goods and engineers, because they are usually able to devote some time to the work without it interfering with their regular line of business.

Manufacturers of heating apparatus usually have a sales office in every large city. It was found to be a good plan to have the local Fuel Administrator call a meeting of the branch managers of these concerns, together with representatives of the American Society of Heating and Ventilating Engineers and similar organizations, and outline the work being done and ask for their cooperation.

These men were formed into a Committee on Practical Conservation. The Fuel Administrator appointed a chairman to work with the Administrator and to line up the other members. This chairman appointed a secretary. The city was divided into districts or zones and a manager appointed for each. These men were willing and able to give the work the required time. The zone managers formed the executive committee known as the Conservation Board. A complete list of all men available for conservation work was compiled and each man assigned to a zone manager. In general, the duties of the Conservation Board were fixed as follows:

(1) To act as an advisory engineering board.

(2) To direct the work of the inspectors.

(3) To pass on allotment appeals by commercial consumers.

(4) To determine the coal allotment in difficult cases.

The board decided to meet at stated intervals. A member of the conservation division was placed in charge of the inspection work and appointed as a member of the Conservation Board to act as chairman of the board. After the Conservation Board was completed a general meeting of the Conservation Committee and all inspectors was called to stimulate interest and outline the work of the inspectors. The duties of the inspectors were given as follows:

(1) To make investigations where the stated coal requirements seem excessive and the information at hand is not sufficient to make an allotment.

(2) To report the conditions of heating plants inspected and make recommendations.

(3) To report any violations of the regulations of the United States Fuel Administration.

(4) To investigate all cases of alleged hoarding and get the necessary evidence to make prosecution possible.

The inspectors have become the police department of the Fuel Administration and the guardians of the city's coal pile.

To make the work effective and free from criticism, inspectors were thoroughly impressed that they were not to recommend any specific apparatus to the consumer. When acting as inspectors they lose their identity and only represent the Fuel Administration. All men connected with this work have been sworn into the Government service. A card has been issued to them from Washington which has been their credentials. It enables them to enter any building for the purpose of making an inspection.

Subjects for inspection have been sent to zone managers by the office of the Fuel Administrator. The zone manager sends them to his inspectors through the branch manager or office of the inspector. All inspectors are under the direct supervision of their branch manager. The inspector makes the investigation, fills in the supplemental report and makes his recommendation. The report is then returned to the zone manager, who recommends an allotment and sends all the papers to the office of the Fuel Administrator.

The inspector's personal opinion of the case is valuable, but it is important that he give the basis of his opinion. Where an allotment is to be made to large buildings it is important that the following facts appear in the questionnaire of the inspector's report:

Kind of heat.

Kind of coal.

Name of manufacturer—size number and grate area of each and every coal-burning unit.

Number of months each is used.

Whether or not the heating plant is adequate.

Whether or not the building is poorly constructed or badly exposed.

Whether stated requirements for previous year check with coal receipts.

Tons of coal on hand (41 cu. ft. equal one ton.)

General information in connection with the distribution system is given in the following short paragraphs:

An order, after being given to a retailer, cannot be cancelled and placed with another dealer.

Consumers are urged to purchase from one dealer only. However, they may place orders with more than one dealer, provided the total orders placed do not exceed the consumer's normal requirements.

A copy of every order is filed with the Bureau of Distribution and the house address charged with the number of tons ordered. This eliminates the possibility of a house receiving more coal than it requires by different persons placing orders for the same address.

Coal cannot be removed from one address to another without a permit.

Bribing, or otherwise inducing a driver to deliver coal to an address other than the one given to the driver by the dealer, is a violation and is subject to prosecution.

Coal dealers are not permitted to de-

liver the final one-third of the consumer's order until all of his customers have received two-thirds of their requirements. But if a dealer has a surplus of one kind of coal, such as egg or pea, and he has no order for that size from persons who have not received their first two-thirds, he is permitted to deliver the final one-third of that amount of coal to customers.

After September 15 coal dealers are not permitted to make "long hauls" outside of a reasonable radius of the yard. Arrangements must be made with a dealer near the consumer, to make the delivery. This is a mutual agreement among dealers.

Dealers are entitled to make a charge for extra labor when the consumer is not home or unprepared to receive the coal when the driver first attempts to make delivery, provided the dealer has given due notice of his intention to make delivery.

Dealers are entitled to charge for carrying in coal. They may also charge for excessive labor, due to local conditions. This charge, however, must be agreed upon between the consumer and the dealer before delivery is made.

Consumers must pay the price prevailing at the time of delivery, regardless of date order was placed.

Prices for the same kind of coal may vary as much as seventy-five cents per ton. The railroad operator must sell his coal to the dealer at seventy-five cents a ton less than the independent operator.

The retail price of coal in Philadelphia is obtained by taking the cost at the mine, fixed by the Government, plus approximately $1.75 per ton freight, plus twenty cents jobber's commission if bought through a jobber, plus the gross margin of $2.50 added by the dealer. This gross margin covers the dealer's overhead expenses, handling, cartage, etc.

To arrive at the average cost per ton to the dealer, the latter takes the total cost of receipts for the previous fifteen-day period, plus cost of stock on hand at the beginning of that period, which gives the total cost for a specified number of tons. This is divided by the number of tons, giving the dealer's average cost per ton. To this is added the gross margin of $2.50, which gives the price per ton to the consumer for the ensuing fifteen-day period. Therefore the dealer gains nothing by delaying delivery. It is to his interest to deliver the coal as quickly as possible.

Private greenhouses are not entitled to coal. Public greenhouses may have 50% of their normal requirements, excepting when their order is for forty tons or under, when they are entitled to the full amount.

Private garages, including those having living quarters, are not entitled to coal. Persons occupying such quarters must be provided for in a house.

Country clubs will not receive any coal after November 1.

All manufacturers have been placed on a preference list and cannot store coal without a permit. They are required to make out a weekly report of coal on hand. The object is to make it possible to give essential industries a reserve stock for emergencies and to keep them running at all times.

Egg and broken coal should be substituted for stove and nut wherever possible. Buckwheat, or a mixture of buckwheat and pea should be substituted for pea coal. Rice and smaller sizes of buckwheat should be substituted for No. 1 buckwheat wherever possible. Such substitution will help the general coal situation.

Most of the foregoing regulations can be carried out through the supervised distribution system because records are kept of every dwelling and building in the city.

LIGHTLESS NIGHTS INAUGURATED.

Again the heating industry came to the assistance of the Fuel Administration when "lightless nights" were put into effect as a measure of further con-

serving coal. Monday, Tuesday, Wednesday and Thursday nights of each week were designated by the United States Fuel Administration as nights on which certain restrictions must be placed on electric lighting, etc., in every city in the United States.

Because of their familiarity with the regulations, it was decided that the men who had been acting as inspectors and instructors in the conservation work were most suitable for taking over the new duties. Their services were again offered gratis and accepted. A board of eight members was appointed, consisting of four members of the American Society of Heating and Ventilating Engineers and four representatives of manufacturers of low-pressure heating apparatus. These consisted of W. A. Bland, of the American Radiator Co., chairman; E. S. Berry, of the Joseph Spear Stove Heating Company, vice-chairman; Frank C. Hibbs, of H. B. Smith Co.; A. P. Goldsmith, of the E. F. Houghton Co.; C. V. Haynes, of the Haynes Selling Co.; A. C. Mott, Jr., of the Abram Cox Stove Co.; H. D. Kellogg, of the H. B. Smith Co., and William E. Tinker, of the National Radiator Co.

The city was divided into eight zones and each member of the board was placed in charge of a zone. About eighty inspectors were selected from among heating salesmen and engineers and they were divided among the zones. Each zone was also divided into districts and one or more inspectors placed in charge of each district.

In order to do effective work it has been necessary for these men to work at night. They have given up their time in the evenings willingly and the work they have done has been very good. In some cases inspectors have been required to work during the day. In this respect their employers have given them as much time off as necessary.

Instructions issued to the inspectors were as follows:

The inspector will call the attention of all violators to the regulations and report each case with full particulars, direct to the zone manager. The latter will report it to the office of the Fuel Administration and a fine will be imposed where the circumstances justify such procedure.

If a light is necessary for public safety or police protection, the inspector will report the case to the zone manager, who will issue a temporary permit. An official permit will be issued in Philadelphia where conditions warrant, by the City Fuel Administrator. The temporary permit is good for not more than ten days.

Inspectors are cautioned to avoid arguments. Give the violator the facts and if he refuses to turn out the lights and cannot show a proper permit, note the case and report it to the zone manager.

Reports of violations received from sources other than from the inspectors will be sent to the inspectors through the zone manager, on a small card. The inspector will investigate the case, make his report on the card and return it to the zone manager. Similar cards will be supplied to the inspectors upon which to make reports of violations he may find, to the zone manager.

Inspectors will report violations outside of their own district to their own zone manager, but will not warn the violator or take the matter up with him.

Avoid stating that a merchant can have all the lights he wants inside at any time and also outside on Friday, Saturday and Sunday nights. Ask them not to use any more current than necessary at any time. The spirit of the regulations is to save current and thus save coal.

LIGHTLESS NIGHT REGULATIONS

Regulations for the "lightless nights" were issued by the Fuel Administration as follows:

No window or outside display lights any day between sunrise and sunset.

No window or outside display lights Monday, Tuesday, Wednesday and Thursday nights.

No "safety" or "police" lights in any windows, including jewelry stores, on lightless days and nights. A "police" light, if necessary, must be inside of the store, away from the window.

Outside fruit stands, etc., not connected with the store, are permitted only sufficient light to conduct business.

No outside or window lights if there is a store in which to do business.

Zone managers will issue a temporary permit for a "public safety" light, not to exceed 25 watts, if conditions warrant, as in the case of a dark step leading to a store entrance.

Theatres are entitled to sufficient light for safety inside the lobby. No outside lights excepting exit lights.

Carnivals, etc., are permitted sufficient light for safety where no wiring is necessary.

As the result of the inspections hundreds of willful violators have been caught. Some of them have been given their choice of paying $50 to the Red Cross or facing prosecution under the Lever Act, which provides a fine of $5,000. Violations have been reduced to a minimum, however, as the result of the inspectors explaining the regulations to persons who did not understand, and by warning obstinate persons. One warning generally suffices, but when it goes beyond that it is considered a willful violation. The regulations now have been in effect over two months and it is assumed that every person has had time to learn them. All violations in Philadelphia in the future will result in the offenders' turning over contributions to the Red Cross or facing prosecution.

Through their work in assisting the United States Fuel Administration, the heating and range experts have won the distinction of being one of the most patriotic bodies of men in the country. Cognizance of this is taken by the Fuel Administration, which is entrusting to them much important work. It is likely that all of these experts who are available will be called upon again and again in the future to give up more of their time in war work. And from the showing they have made it is certain that they will never be found lacking and that they will keep up their standard of excellence.

In assisting in the conservation of coal these patriotic men are helping the boys in the trenches to push back the Hun horde. Every ton of coal they caused to be saved means more steel for bullets and a smaller casualty list.

STANDARDS OF CENTRAL STATION HOT WATER HEATING SERVICE

Established by the Public Service Commission of Indiana Under Date of August 3, 1918.

Acting on the recommendations of its engineering department the Public Service Commission of Indiana has established a notable set of standards of central station hot water heating, which are promulgated as Order No. 4082. They went into effect August 3, 1918.

The commission's action is the direct result of the fact that central station hot water utilities, in the past, have been billing their consumers on the basis of square feet of radiation required by formulae and not upon the square feet of radiation set. This has led to what was described by the commission as an acute situation due to high and unreasonable billing and a lack of good service.

Incidentally, the investigation conducted by the commission showed that there are very few central station hot water heating plants in the United States outside of the middle west. The United States Bureau of Standards reported that most of the plants are to be found in Ohio, Indiana, Michigan, Wisconsin, Illinois and Minnesota.

The principal items in the new standards are given in the following:

OPERATIONS AND MAINTENANCE.

Boiler horsepower.—There shall be available for use at times of zero weather at least 6 B. H. P. capacity for each 1000 sq. ft. of radiation connected to the utility's mains.

Pressure and Flow of Water in Mains.—(a) Pressure Variation. The pressure of the water supplied by any utility as measured at the consumer's service where it enters the building shall not indicate a differential pressure of less than ½ lb. per square inch working pressure between flow and return pipes and the average pressure in flow and return service pipes shall be sufficient at all times completely to fill all radiators in the consumer's installation.

(b) Pressure Surveys. Each hot water heating utility shall provide itself with the proper gauges and instruments and shall take and record on order of the commission measurements of the water pressures and variations in pressure throughout the system at points indicated on a map of the distribution system on file with the commission.

(c) Flow. The utility shall be equipped and prepared to furnish at least 6 lbs. of water at the consumer's premises per square foot of radiation per hour.

TEMPERATURE PRESSURE AND FLOW OF WATER IN MAINS AND SERVICES.

Under this heading the rules state that each utility shall provide itself with the proper thermometers and other instruments and shall make records on order of the commission of the temperature of the water throughout the system at points indicated on a map of the distribution system on file with the commission.

In new installations the consumer is to pay for the necessary connections for taking the temperature and pressure of the flow and return. This also applies to old installations where there is complaint of inadequate service. The utility itself, however, is to provide the necessary indicating and recording instruments for making the tests.

STATION OPERATING SCHEDULE OF TEMPERATURES.

(a) The standard for heating service shall be determined by the average temperature of the flow and return water

in the mains at the heating plant of the utility and shall not be less than that indicated in the following table showing the average temperatures of flow and return.

(b) The average temperature of station flow and return water shall be determined by dividing by two the sum of the temperature of the water in the flow main and the temperature of the water in the return main.

STATION RECORDS.

Each utility shall keep a station record, which record shall show at least the hourly readings of:

The temperature of the water in the flow main.

The temperature of the water in the return main.

The temperature of the outside atmosphere.

TABLE I

Table Showing Average Temperatures of Flow and Return Water.

Outside Temperature, Degrees F.	Day Shedule.	Permissible Night Schedules	
	6:00 a. m. to 6:00 p. m.	6:00 p. m. to 9:30 p. m. 3:30 a. m. to 6:00 a. m.	9:30 p. m. to 3:30 a. m.
70	80	85	70
65	92	98	82
60	102	107	92
55	111	116	101
50	121	126	111
45	129	134	119
40	137	142	128
35	144	148	136
30	151	154	145
25	158	160	154
20	164	165	162
15	170	170	170
10	175	175	175
5	180	180	180
zero	184	184	184
–5	187	187	187
–10	190	190	190
–15	191	191	191
–20	192	192	192

Note.—See appendix for schedule of station flow temperature.

TABLE II

Table Showing Temperature-Lowering Coefficients of Wind Movements.

Outside Temperature, Deg. F.	Temperature-Lowering Effect per Mile per Hour, Deg. F.
50 to 40	0.75
40 to 30	1.00
30 to 20	1.10
20 to 10	1.20
10 to 0	1.30
0 to –10	1.40
–10 to –20	1.50

TABLE III

Table Showing Temperature-Lowering Effect of Wind.

Outside Temperature, Deg. F.	Wind Light. 5 to 10 m. p. h.	Medium. 10 to 15 m. p. h.	Strong. 15 to 20 m. p. h.
50 to 40	6°	9°	13°
40 to 30	8	13	17
30 to 20	8	14	19
20 to 10	9	15	21
10 to 0	10	16	23
0 to –10	10	17	25
–10 to –20	11	19	26

Note.—The plant operator will vary these wind coefficients to suit local conditions.

The pressure of the water in the flow main.

The pressure of the water in the return main.

The wind velocity where there is installed a suitable wind gauge.

Also, the pounds of coal burned per month where it is not practicable to get daily reports.

The time of starting and shutting down boilers, heating equipment and pumps.

And such other data as is required to determine the characteristics of the load.

SEDIMENT IN MAINS.

Each utility shall provide blow-out pipes, on all lateral extensions of mains and at other necessary places in the distribution system for the removal of sediment in the mains. The mains shall be maintained free of sediment.

Information for Consumers.

Billing of Consumers for Service.—Bills rendered to consumers, it is stipulated shall show the number of square feet of radiation set, all flat rate charges, and the price per unit of service. On bills computed on any other basis the other factors shall be clearly stated.

The billing for all consumers having new heating installations or altered heating installations, shall be based upon the radiation set.

Bills rendered to old customers or to consumers whose radiation has not been altered shall be based upon the radiation set when the amount of radiation set is the correct amount as determined by inspection or test made by the utility subject to the approval of the commission.

The total square feet of radiation set in any consumer's installation shall include in addition to the cast-iron radiators, all exposed piping, indirect radiation and such other radiating surfaces which are not covered by suitable pipe covering.

The consumer shall install storm sash strips or other equally effective protections to the doors and windows and keep them securely fastened in place and maintained so during the heating season.

The company shall at all times exercise reasonable diligence in supplying water in sufficient amount and of such a temperature, as will reasonably heat the premises of the consumer, with all windows and other openings properly closed and maintained.

The company shall furnish hot water in a sufficient quantity to heat the building to a temperature of not less than 70° F., when the outside temperature is 0° F., and above provided that sufficient radiation be installed by the consumer to maintain the desired temperature.

(h) The consumer shall not in any manner change, divert or use the water circulating through said interior system, and shall exercise at all times reasonable care for the protection of the utility's property on the premises and shall not install any additional radiation in said premises without the written consent of the utility.

Indirect Radiation.—Indirect radiation is not recommended but when installed shall be charged for at a rate, 100% in excess of the rate for direct radiation.

UNDERSET RADIATION.

Consumers having less than the proper amount of radiation installed shall be billed at the following increased rate until such time as they can procure and install the proper amount of radiation. Rates for direct radiation, where less than normal or standard amount of radiation is installed:

90% of normal or standard radiation installed, add 5% to normal rate.

80% of normal or standard radiation installed, add 10% to normal rate.

70% of normal or standard radiation installed, add 15% to normal rate.

60% of normal or standard radiation installed, add 20% to normal rate.

50% of normal or standard radiation installed, add 25% to normal rate.

NOTE.—By normal or standard amount of radiation is meant the radiator area required to keep the room or building at 70° F. inside when the outside temperature is zero in calm weather.

Test on Request of Consumer to Utility.—In case of complaint by a consumer, the utility is to immediately investigate the heating consumer's heating system and remedy the difficulty, unless the utility is not at fault when it shall recommend to the consumer in writing what changes should be made to give the desired service.

Evidence of the adequacy of service shall be that, with all radiator valves open and radiators free from sediment, the average temperature of the flow and return water, measured at or near the point of entrance of the service pipes to the building, shall not be less than the day schedule of temperature given in the table of average temperatures of flow and return.

Evidence of the adequacy of the number of square feet of radiation set shall be that, with all the radiator valves open and radiators free from sediment, and the average temperature of the flow and return water maintained as given in table of average temperatures for the day schedule, making allowance for temperature-lowering effects of wind velocity, and with the outside openings, such as doors and windows, etc., properly closed and maintained so as to exclude the outside air in cold weather, and the utility furnishing at least 6 lbs. of water per square foot of radiation, and with pressure differential between flow and return pipe maintained to at least ½ lb. per square inch working pressure and the inside building temperature maintained at 70° F., then and in that case the number of square feet of radiation shall be considered as adequate.

Where a test of a consumer's installation is made by the commission upon formal application of any consumer, if the utility is at fault the expense of the investigation shall be borne by the utility and vice versa.

Regulation of Consumer's Service.—Each utility may regulate the water on the consumer's installation by thermostatic regulator, differential valve, or other device to be maintained at its own expense. The utility is to clean out the consumer's installation at reasonable intervals.

Payment for heating service.—All hot water heating service shall be furnished on a season basis and bills shall be payable monthly from October 1 to April 1, inclusive. The per cent of the total heating bill that shall be due per month for service shall be determined by the utility, subject to the approval of the commission and included as part of the contract with the consumer.

The following payments for heating service are recommended:

October 1st	10%
November 1st	15%
December 1st	15%
January 1st	20%
February 1st	20%
March 1st	10%
April 1st	10%

A consumer receiving service as per his request for a period less than the full heating season shall be charged one-half of the regular rate for that portion of the heating season in which service is not taken and at the full rate for that part of the season in which service is taken.

HEATING SEASON.

Each utility shall contract to maintain regular heating service from October 1 to April 30, whenever the outside temperature is at a point below 60° F., and at such other times after September 14 and before May 21 when the outside temperature is 60° F., or below.

Radiation Requirements.

Temperature in Consumer's Premis-

es.—Each utility shall contract to deliver hot water in sufficient quantites to maintain in the consumer's premises the agreed upon temperature when the outside temperature is 0° F., provided, however, that doors, windows and ventilators are closed and tight and the premises are in evidence of good repair and that there is sufficient radiation set.

ESTIMATING RADIATION REQUIRED

As a tentative basis for the billing of contemplated new consumers and of such other consumers where there is complaint of inadequate service indicating insufficient radition, each utility shall measure the buildings and premises of said consumers for radiation required by the formula and as set out in the table showing temperature-lowering coefficients of wind movements.

Upon the request of any consumer, or the commission, the utility shall furnish a complete detailed set of figures and data relating to the radiation requirements, in said consumer's premises, upon which it is proposed that the consumer is to be billed for heating service.

The utility supplying hot water heating service shall not be required to contract with any consumer to heat only a part of the used portion of a building, residence, or apartment where such other parts of the building or buildings are not provided with adequate radiation suitably connected.

TABLE SHOWING FORMULA FOR ESTIMATING RADIATION.

$$R=C \times Fc+(E-W-D) \times Fe+(W \times Fw)+(D \times Fd)$$

Where: R=Required radiation in square feet.
C=Cubic feet of contents.
E=Square feet of exposed walls.
W=Square feet of windows.
D=Square feet of doors.
Fc=Factor for cubic contents as shown in table.
Fe=Factor for exposed walls, ceiling or floors as shown in table.
Fw=Factor for windows as shown in table.
Fd=Factor for doors as shown in table.

TABLE OF FACTORS

Kind of Exposure.	Difference in Temperature Between Room and Outside.				
Fw	60°	65°	70°	75°	80°
Single glass	0.478	0.517	0.557	0.595	0.705
Double or plate glass	.212	.229	.247	.265	.282
Single sky light	.382	.413	.445	.477	.508
Double sky light	.212	.229	.247	.265	.282
Fd					
Good door, one-half glass	.244	.265	.285	.305	.325
Good door, solid	.170	.184	.198	.212	.226
Fe					
Frame wall (N-W exposure)	.148	.160	.173	.185	.198
Frame wall (S-E exposure)	.134	.146	.159	.171	.184
12-in. masonry wall (N-W exposure)	.106	.115	.124	.132	.141
12-in. masonry wall (S-E exposure)	.093	.102	.111	.119	.128
17-in. masonry wall (N-W exposure)	.085	.092	.099	.106	.113
17-in. masonry wall (S-E exposure)	.071	.178	.085	.092	.099
Ceiling with no heat in space above	.106	.115	.124	.132	.141
Floor with no heat in space below	.053	.057	.062	.067	.071
Partition wall (frame plastered) but no heat on other side	.071	.077	.082	.088	.094
Cubic Contents.					
Fc					
½ change of air per hour—Garages, etc.	.0032	.0035	.0038	.0040	.0043
1 change of air per hour—Dwellings, Offices, etc.	.0064	.0069	.0075	.0080	.0086
2 change of air per hour—Public assembly rooms	.0128	.0139	0150	.0160	.0172

Appendix.

TABLE A. STATION FLOW TEMPERATURES

Outside Temperature, Degree F.	DAY SCHEDULE, 6:00 a. m. to 6:00 p. m.	PERMISSIBLE NIGHT SCHEDULES 6:00 p. m. to 9:30 p. m. and 3:30 a. m. to 6:00 a. m.	9:30 p. m. to 3:30 a. m.
70	85	90	75
65	97	103	87
60	109	115	99
55	120	125	110
50	130	135	120
45	139	144	129
40	148	152	139
35	156	160	148
30	164	167	158
25	171	174	167
20	178	179	176
15	185	185	185
10	190	190	190
5	195	195	195
zero	200	200	200
–5	203	203	203
–10	206	206	206
–15	208	208	208
–20	210	210	210

NOTE.—In case of difficulty in maintaining the average temperatures with these flow temperatures, increase the rate of pumpage.

NEW HEAT TRANSMISSION TABLES

A Remarkable Compilation of Factors as Given by Leading Authorities Covering Latest Types of Construction.

By WILLIAM R. JONES,
Superintendent, Department of Buildings and Grounds, University of Pennsylvania.

EDITOR'S NOTE.—*We feel fortunate in being able to present to our readers, commencing in this issue, a series of tables of heat transmission coefficients which are probably the most complete and the most usefully arranged that have made their appearance. No less than 43 tables are included in the complete series, several of which will appear in each issue.*

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for poor construction 30%

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GLASS	THICKNESS	A U. OF PA.	RECKNAGEL & REITSCHEL	AUSTRIAN GOV (MACON)	IRWIN	THOMPSON	SNOW	TWEED	NAT. DIST. HEAT. ASSO	AMERICAN RAD. CO.	GREENE 1913	H.G.V. MAGAZINE 1917						
SINGLE WINDOW WIRE GLASS		1.09		1.04	1.0			1.35										
SINGLE WINDOW DOUBLE GLASS		.62	CC .62				KK .614					WW .62						
SINGLE MONITOR GLASS	STD.	1.30				HHH 1.40 / X 1.35			RRR 1.10	TTT .950								
WINDOW GLASS WET		1.10									TIII 1.1, ⅛" THICK							

HHH—FEDERAL BLDG
HHH—FACTORY
X OPENING IN BRICK WORK MEASURED AS TOTAL GLASS SURFACE.
RRR VOL. NO. 2 JAN. 15, 1916

GLASS	THICKNESS	U.S.ED BY U. OF PA. A	GERMAN Gov (A.R. Wolff) B	REICHNAGEL REITSCHEL C & R	PECLET (CARPENTER) E	B.F. STURTEVANT CATS 814 & 215 F	AUSTRIAN Gov (Macon) G	HAUSS GER. PRACTICE Y	HARDING P	THOMPSON FEDERAL BLDGS. H	THOMPSON FACTORY BLDGS. H	GREENE 1913 I	BUFFALO FORGE CO. J	SNOW K	HUBBARD L	HARRISON M	ALLEN N	HOFFMAN O	TWEED Q	NAT. DIST. HEAT. A350. R	PRACTICAL ENG. S	AMERICAN RAD. CO T	PRUSSIAN Gov (REICHNAGEL) V	HOV MAGAZINE 1917— W	DONNELLY X	IRWIN N	
SINGLE WINDOW — WINDOW HEIGHTS	STD.	1.09	.776	1.09		1215	1.08	1.00	1.126	1.00	1.20	.96	1.09	1.10	1.20	1.25	.776	1.0	1.05		1.2	1.09	1.03	1.00	1.00	1.10
	TIGHT	1.07					1.07					¼ INCH THICK								1.07							
	WEATHER STRIPPED	.90																		.90							
	MEDIUM	1.20																		1.20							
	LOOSE	1.35																		1.35							
	3'-3"			.380																							
	6'-7"			.945																							
	10'-0"			.930																							
	13'-3"			.920																							
	16'-3"			.910																.74							
	PLATE	.74																									
DOUBLE WINDOW — SASH		AA	BB	CC		FF	GG	YY	PP	HHa	HHb	II	JJ	KK	LL	MM	NN	OO	QQ	RR	SS	TT	VV	WW	XX	ZZ	
	STD.	.62	.518	.46		.572	.47	.46	.45	.50	.56	.41	.46	.457	.60	.62	.518	.6	.5	.52	.6	.560	.472	.56	.571	.572	
									TRIPLE SASH .281			½ INCH THICK															
SINGLE SKY-LIGHT GLASS — SKY-LIGHT GLASS		AAA	BBB	CCC		FFF	GGG	YYY	PPP	HHHa	HHHb	III	JJJ		LLL	MMM	NNN	OOO	QQQ	RRR	SSS	TTT	VVV	WWW	XXX	ZZZ	
	STD.	1.16	1.118	1.16		1.03	1.14	1.06		1.50	1.50	1.06	1.16	1.157	1.30		1.118	1.1	1.1	1.12	1.2	1.118	1.09	1.16	1.00	1.03	
												¾" THICK															
DOUBLE SKY-LIGHT GLASS — AIR SPACE		AAAA	BBBB	CCCC		FFFF	GGGG	YYYY	PPPP	HHHH	HHHH	IIII	JJJJ		LLLL	MMMM	NNNN	OOOO	QQQQ	RRRR	SSSS	TTTT	VVVV	WWWW	XXXX	ZZZZ	
	STD.	.62	.621	.48		.621	.48	.48		.50	.62	.51	.48		.65		.621	.7	.6	.57	.65	.621	.492	.048	.571	.621	
												¾" THICK															

H, HH, HHH, HHHH, HHHHH — OPENING IN BRICK WORK MEASURED AS TOTAL GLASS SURFACE.

U, UU, UUU — AVERAGE OF VALUES FOR VARIOUS TEMPERATURE DIFFERENCES

E — FOR MULTIPLE GLASS ABOVE, CONSTANTS ARE TO BE MULTIPLIED AS FOLLOWS:
DOUBLE BY ½
TRIPLE BY ⅔
QUADRUPLE BY ¾
N LAYERS BY $\frac{1}{1+N}$

WALLS	THICKNESS	USED BY C. OF R.	GERMAN Gas Works	R. WOLFF	RICHMAGEL	RIETSCHEL	PRUSSIAN Gas Co.	RECKNAGEL	PROJECT	CARPENTER	B.T.U. SYSTEM (ARMSTRONG)	AUSTRIAN GOV'T (MACON)	HAUS Gas Practice	GREENE	BUFFALO FORGE Co.	SNOW	HUBBARD	HARRISON	ALLEN	HOFFMAN	HARDING	TWEED	NAT. DIST. HEAT ASSN	PRACTICAL ENGINEERING	AMERICAN RAD. Co.	DUNNELLY	HAVEN MAGAZINE	THOMPSON I WALL EXPOSED	THOMPSON 2 WALLS EXPOSED	THOMPSON FACTORY BLOCK	IRWIN	CUSEY	SPANGLER			
BRICK	4"	.60	.680	.520	.492	—	—	—	—	.430	.658	—	.48	.350	.320	—	—	.660	.680	—	—	.550	.520	.700	.680	—	.68	.40	—	—	.680	.654	—	—			
	8"	.42	.460	.370	.348	—	—	—	—	.370	.458	—	.34	.390	.370	.343	.400	.460	.460	.400	.310	.363	.390	.400	.500	.460	.586	.40	.318	.278	.350	.460	.458	.37			
	12"	.32	.320	.290	—	—	—	—	—	.320	.315	—	—	.310	.290	.300	.320	.300	.320	.310	.281	.310	.300	.400	.300	.270	.584	.31	.252	.246	.270	.350	.315	.29			
	16"	.26	.260	.250	—	—	—	—	—	.280	.258	—	.26	.250	.250	.257	.260	.260	.260	.260	—	.250	.220	.250	.300	.270	.228	.23	.224	.222	.230	.228	.250	.25			
	20"	.23	.230	.220	.226	—	—	—	—	.250	.228	—	.22	.210	.220	.228	.220	.230	.230	.230	.210	.220	.210	.220	.250	.230	—	.20	.200	.180	.200	.194	—			
	24"	.20	.200	.190	.184	—	—	—	—	.240	.194	—	.18	.180	.190	.200	.200	.200	.190	—	.210	.174	.180	.160	.200	.200	.186	.18	.162	.168	.180	.180	—			
	28"	.18	.174	.160	—	—	—	—	—	.220	.165	—	—	.160	—	—	.171	—	.160	—	—	—	—	—	.150	.160	—	.16	.156	.144	.160	.150	.148			
	32"	.17	—	—	.164	—	—	—	—	—	—	—	.16	—	.150	—	—	—	—	.170	—	—	.150	—	—	—	—	.12	.144	.136	.150	.130	—			
	36"	.16	.150	.140	—	.210	.143	—	.13	.200	.129	—	.13	—	—	.143	—	.130	—	—	—	—	—	—	—	—	—	—	.134	.124	.130	—	—			
	40"	.14	.129	.120	.133	.200	.114	—	.12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
	46"	.13	.115	.110	.123	.160	.114	—	.11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
	18"	.25	11	—	.115	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
			AA	BB	CC		DD		EE	FF		GG				JJ	KK	LL	MM	NN	OO		QQ	RR	SS	TT		XX	WW	HH$_1$	HH$_2$		UU			
BRICK PLASTER	4"	.49	—	.490	—	—	—	—	—	—	—	—	—	—	—	.510	.500	—	—	—	—	—	—	.490	—	—	—	.70	—	—	—	—	—			
	8"	.38	—	.360	—	—	—	—	—	—	—	—	.43	—	—	.370	.360	—	—	—	—	—	—	.380	—	—	—	.500	.42	—	—	—	—			
	12"	.29	—	.280	—	—	—	—	—	—	—	—	.34	—	—	.290	.280	—	—	—	—	—	—	.290	—	—	—	.342	.33	.305	.267	—	—			
	16"	.25	—	.240	—	—	—	—	—	—	—	—	.29	—	—	.240	.240	—	—	—	—	—	—	.240	—	—	—	.287	.25	.242	.236	—	—			
	20"	.22	—	.210	—	—	—	—	—	—	—	—	.24	—	—	.210	.210	—	—	—	—	—	—	.210	—	—	—	.247	.23	.215	.213	—	—			
	24"	.19	—	.180	—	—	—	—	—	—	—	—	.21	—	—	.180	.180	—	—	—	—	—	—	—	—	—	—	.214	.21	.192	.173	—	—			
	28"	.17	—	.160	—	—	—	—	—	—	—	—	.18	—	—	.160	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—			
	32"	.15	—	.140	—	—	—	—	—	—	—	—	.16	—	—	.140	—	—	—	—	—	—	—	—	—	—	—	.171	.19	.175	.161	—	—			
	36"	.13	—	.120	—	—	—	—	—	—	—	—	.14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.150	.138	—	—			
	40"	.13	—	—	—	—	—	—	—	—	—	—	.13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.17	.13	.138	.130	—	—			
BRICK PLASTERED ONE SIDE	30"	.16																											.129	.119	—	—			

TESTS BY HARDING

E - See Stone Wall

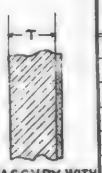
V - (Upper figures are equivalent of sizes in metric system

O See Brick Wall, furring, lath and plaster

See Stone Wall

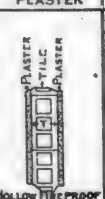
U - Average of values for various temperature differences.

WALLS

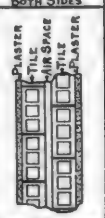


MASONRY WITH PLASTER

Thickness T	Used by U. of Pa. A	Greene 1913 L	Tweed Q	Nat. Dist. Heat. Asso. R	Harding P	Heating and Ventilating Magazine Wa	Wb	Wc
8"								
12"	.51	.51						
18"	.43	.43						
24"	.37	.37						
30"	.32	.32						
36"	.28	.28						
48"		.23						
		LL	QQ	RR	PP	WWa	WWb	WWc
Not Stated		.30	.30	.30				
4"	.40				.325	.79	.75	.34
8"	.31					.56	.54	.27
12"	.26					.44	.41	.26
16"	.23					.40	.37	.23
20"	.20					.33	.31	.20
2"	.47				.409			
6"	.36				.281			
		III		RRR				
Not Stated	.21	.21						



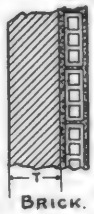
HOLLOW FIREPROOF TILE WITH PLASTER BOTH SIDES



DOUBLE FIREPROOF TILE WITH PLASTER BOTH SIDES. AIR SPACE IN CENTER

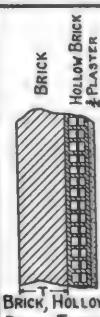
WWa TERRA COTTA OR TILE, PLAIN.
WWb " " " TILE & STUCCO.
WWc " " " " PLASTER.

WALLS



BRICK, HOLLOW TILE, CEMENT MORTAR

Thickness T	Used by U. of P. A	Harding W	Greene (1913) L
9"	.30	.24	
		2" Hollow Tile, ½" Cement Mortar	
	AA		II
8"	.29		.29
12"	.24		.24
16"	.20		.20
18"			
20"	.18		.18
21"			
24"	.16		.16
27"			
28"	.14		.14
30"			
32"	.13		13
33"			
36"			
40"			

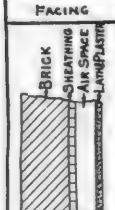


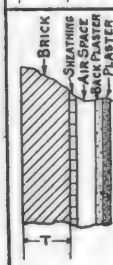
BRICK, HOLLOW-BRICK-FURRING PLASTERED ONE SIDE

WALLS

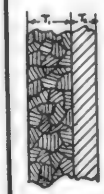
CONCRETE WITH SANDSTONE FACING

Thickness T	Used by U. of Pa. A	Recknagel Reitschel C	Nat. Dist. Heat. Asso. R	H. & V. Magazine W
12"	.45		—	.45
16"	.39		—	.39
20"	.35		—	.35
24"	.31		—	.31
28"	.28	—	—	.28
32"	.26	—	—	.26
—		—	—	
	AA		RR	
	.17	—	.17	
		—	—	
		—	—	
		—	—	
		—	—	
		—	—	
		—	—	
	AAA		RRR	
	14		.14	





WALLS



PLAIN

PLASTERED

FURRED AND PLASTERED

BRICK WITH SANDSTONE FACING

Brick T_1 Thickness	Sandstone T_2	Plast. B.R.P.C. Used by U. of Pa. A	Recknagel & Reitschel C	Thompson Ha	Hb	Hc	H. & V. Magazine 1917 W
4"	4"	.41		.324	.31	.270	.31
8"	4"	.34	.31	.230	.22	.192	.22
12"	4"	.28	.25	.178	.17	.148	.17
16"	4"	.23	.22				.21
20"	4"	.19	.19				.20
24"	4"	.17	.17				.17
28"	4"	.15	.15				.16
4"	8"	.35		.303	.29	.252	.29
8"	8"	.29	.29	.205	.20	.174	.20
12"	8"	.24	.23	.167	.16	.139	.16
16"	8"	.20	.20				.20
20"	8"	.18	.18				.19
24"	8"	.16	.16				.16
28"	8"	.14	.14				.14
4"	12"	.30		271	.26	.226	.26
8"	12"	.25	.26	.198	.19	.165	.19
12"	12"	.21	.21	.157	.15	.131	.15
16"	12"	.19	.19	PLAIN	PLASTERED	FURRED AND PLASTERED	.19
20"	12"	.17	.17				.17
24"	12"	.15	.15				.14
28"	12"	.13	.13				.13
		PLASTERED	PLASTERED				GIVEN AS BRICK AND SANDSTONE

WALLS

SANDSTONE

THICKNESS T	USED BY U. OF PA. A	RECKNAGEL REITSCHEL C	PECLET (CARPENTER) E	AUSTRIAN GOV. (MACON) G	THOMPSON Ha*	THOMPSON Ha▲	GREENE 1913 I	SNOW K	HUBBARD L	HARRISON M	HOFFMAN BRICK+50% O	TWEED P	NAT. DIST. HEAT. ASSO. R	AMERICAN RADIATOR CO. T	PRUSSIAN GOV. RECKNAGEL V	H & V MAGAZINE 1917— X	HAUSS GER. PRACTICE Y	IRWIN Z
12"	.48	.45	.32	.58	.54	.52	.54	.443		.45	.465	.28		.440	.451	.50	.45	.45
16"	.41	.39	.28	.51	.47	.45		.385	.34	.39	.390			.360	.390	.45	.39	.39
20"	.37	.35	.25	.45	.42	.40	.45	.357	.29	.35	.345			.307	.348	.40	.35	.35
24"	.35	.31	.24	.41	.37	.36	.39	.300	.27	.32	.315	.23		.263	.318	.36	.32	.32
28"	.29	.28	.22	.37	.34	.32		.270	.24		.285			.240	.287	.32	.29	
30"	.28	—	—				.34			.28								
32"	.29	.26	.21	.33	.31	.30			.21		.255	.19		.214	.266	.28	.26	GIVEN AS SOLID STONE
36"	.26	.24	.20	.31	.29	.28	.30	.243	GIVEN AS SOLID STONE	.24				.200	.246		.24	
40"	.25	.22	.18	.29	.26	.25					GIVEN AS SOLID STONE			BRICK +33⅓%	.226		.22	
44"	.24	.21	GIVEN 2" AS STONE OR BRICK .26				GIVEN AS MASONRY	.200							.205		.20	
48"	.23	.19		DOES NOT STATE WHETHER PLASTERED OR NOT. PROBABLY PLASTERED			.24	GIVEN FOR STONE WALLS, RUBBLE OR BLOCK MASONRY.							.195		.19	
8"	.60										.600							

SANDSTONE WITH 2" TERRA COTTA OR WOOD FURRING AND PLASTER

12"	.40				.45	.28	GIVEN AS MASONRY	GIVEN FOR STONE WALLS, RUBBLE OR BLOCK MASONRY.			.326	.28	.47					
16"	.34				.39				.272		.273		.41					
18"	.32					.25						.25						
20"	.31			DOES NOT STATE WHETHER PLASTERED OR NOT. PROBABLY PLASTERED	.35				.232		.242		.37					
24"	.28				.31	.23			.216		.221	.23	.33					
28"	.25				.28				.192		.200		.30					
30"	.24					.21						.21						
32"	.23				.26				.168		.179							
33"	.23												.28					
36"	.22				.24	.19			80% VALUE FOR UNFURRED WALL			.19	.26					
40"	.21				.22								.24					
44"	.20												.20					
48"	.19					.17						.17						
8"	.50										.42							

Ha * SANDSTONE, PLAIN = FURRED AND PLASTERED SANDSTONE + 20%
Ha ▲ SANDSTONE PLASTERED ONLY = " " " " + 15%.

WALLS

LIMESTONE

THICKNESS T	USED BY U. OF PA. A	AUSTRIAN GOV. (MACON) G	RECKNAGEL & REITSCHEL E	PECLET (CARPENTER) F	PRUSSIAN GOV. (RECKNAGEL) V	GREENE 1913 I	SNOW (SANDSTONE+10%) K	HUBBARD L	HOFFMAN BRICK+50% O	NAT. DIST HEAT. ASSO. R	AMERICAN RADIATOR CO. BRICK+33⅓% T	H & V MAGAZINE 1917— X	THOMPSON Ha*	THOMPSON Ha▲	HAUSS GER. PRACTICE Y	IRWIN Z	
8"	.63								.600								
12"	.51	.64	.49	.32	.496	.54	.487		.465		.440	49	.598	.564	.495	.45	
16"	.43	.56	.43	.28	.429		.424	.34	.390		.360	46	.516	.495	.429	.39	
18"	.41			.26		.45											
20"	.39	.50	.38	.25	.383		.393	.29	.345		.307	.41	.456	.437	.385	35	
24"	.35	.45	.35	.24	.350	.39	.330	.27	.315		.263	.37	.420	.403	.352	.32	
28"	.31	.41	.31	.22	.316		.299	.24	.285		.240	.33	.372	.357	.319		
30"	.30					.34										GIVEN AS SOLID STONE	
32"	.29	.36	.28	.21	.293			.21	.255		.214	.29	.336	.322	.286		
36"	.28	.34	.26	.20	.271	.30	.267	GIVEN AS SOLID STONE	GIVEN AS SOLID STONE		.200		.312	.299	.264		
40"	.27	.32	.24	.18	.249	GIVEN AS MASONRY							.298	.276	.242		
44"	.26		.23	GIVEN AS STONE OR BRICK	.225		.220								.220		
48"	.25		.21		.214	.24									.209		

LIMESTONE WITH 2" TERRA COTTA OR WOOD FURRING AND PLASTER

12"	.43					.28			.326	.52			.49				
16"	.36	DOES NOT STATE WHETHER PLASTERED OR NOT. PROBABLY PLASTERED						.272	.273	.46			.43				
18"	.34					.25											
20"	.32							.232	.242	.41			.38				
24"	.29					.23		.216	.221	.38			.35				
28"	.27							.192	.200	.34			.31				
30"	.25					.21											
32"	.24							.168	.179	.32			.28				
36"	.23					.19				.29			.26				
40"	.23					GIVEN AS MASONRY		80% OF UNFURRED LIMESTONE		.26			.24				
44"	.22									.23							
48"	.21					.17											

Ha * LIMESTONE, PLAIN = FURRED AND PLASTERED LIMESTONE + 20%
Ha ▲ LIMESTONE, PLASTERED ONLY = " " " " + 15%

CHICAGO COMMISSION ON VENTILATION

A VENTILATION PARADOX

The Use of Air From Chicago's Freight Tunnel as a Refrigerating Agent and Fuel Conserver.

By THOMAS R. WILSON
Ventilation Engineer, Chicago Health Department.

Traffic congestion prior to 1901 in the "Loop" district of Chicago was a serious problem for the municipality. This was due in great part to the transportation of coal, freight and the various wastes of our industrial and civic life. The obstruction to street car transportation from slow-moving traffic; the difficulties and delays from fallen horses on icy streets; the inclemencies of the weather, and the other numerous agents incidental to this congestion called for relief.

This traffic need culminated in 1901 in a franchise being granted to the Illinois Tunnel Company to construct and operate a telephone and freight tunnel some 40 ft. below Chicago datum. The tunnel was designed for single track service, the bore being 7 x 6.5 ft. Work was started in 1903 and has continued until at the present time there are approximately 56 miles of tunnel beneath the downtown district and some of the territory outside of the "Loop."

CONSTRUCTION WORK DONE UNDER COMPRESSED AIR.

Many difficulties were encountered during the construction work, due to quick-sand, water, soft ground, etc., and practically all the methods known in soft-ground mining were in operation during the work. Most of the driving was done under compressed air. This, by the way, would have afforded an excellent opportunity for ventilation research work, as in a large number of the headings, which extended from 1 to 2 miles from the air locks, the air was so poor in quality that it would not support a naked flame. The men toiled

FIG. 1.—CHICAGO FREIGHT TUNNEL UNDER CONSTRUCTION.

eight hours each day in this atmosphere under a pressure ranging from 10 to 24 lbs. per square inch. The air had been breathed and rebreathed by both men and mules. The relative humidity was close to 100% and the temperature averaged about 50° F. The oxygen content was so low that it would not support combustion. Yet in the opinion of the author, who spent over four years on the actual construction work, there was no more sickness among the men than would have occurred among an equal number of employees in a modern up-to-date office building.

ENORMOUS STORAGE OF HEAT BY TUNNEL WALLS.

The enormous quantities of water, clay, hard-pan and other materials, through which the tunnel is driven, act as a great reservoir of heat, extracting heat from the tunnel air when

FIG. 2.—LOADED TRAIN AT STREET INTERSECTION, CHICAGO FREIGHT TUNNEL.

At the present time this situation does not exist. Construction work is confined to outlying districts and to minor lateral connections to buildings, the present operations being "open-tunnel" work.

The air locks have been removed and numerous shafts and other entrances substituted. The air changes from these openings and the piston action of the trains, which practically fill the entire bore of the tunnel, are sufficient to adequately ventilate the tunnel, the CO_2 content from actual tests being practically the same as that noted in the outer air. As a protection to life and property water-tight doors have been constructed at suitable points so that they can be closed in case of floods, gas leaks or other accidents, segregating these parts of the tunnel.

the latter is warmer than the tunnel surface and surrounding materials. Its conductivity is so great that the heat extracted from the air is immediately conducted from the tunnel surface to the cooler materials beyond. The seepage of water back and forth through the various strata also tends to convey heat from the air during the summer months, greatly assisting in maintaining an equal temperature.

During cold weather the opposite flow of heat takes place. The tremendous heat reserve, stored in the ma-

terials about the tunnel, is given back to the air through the millions of square feet of tunnel surface.

So accurately do these conditions balance that the entire temperature variation throughout the year in the tunnel air is less than 10°. In the summer months a saturated condition of the air is almost always present, owing to the outside air being cooled to the dew point. This keeps the tunnel air practically free from dust as the condensation of vapor on the walls of the bore makes of the latter a continuous eliminating plate. A further dust removal occurs from the condensation of moisture on the dust particles, thus increasing their weight and causing their precipitation to the tunnel invert.

In the summer of 1916 a complaint was received by the Division of Ventilation of the Chicago Health Department, respecting the use of tunnel air in a cold-meat storage room of a certain down-town hotel. The complainant was convinced that the use of this air must of necessity be unsanitary and he requested, therefore, an investigation by the department. The matter was referred to the writer. The room in question was inspected and all of the known tests for air purity and conditions were made. The following is the laboratory report of the samples taken at the time:

Dust 0
Bacteria 0
colonies on a two-minute plate.
CO_2 ..... 3.5
to 3.8 parts per 10,000 parts of air.

The psychrometric readings were as follows:

Temperature—dry-bulb ..... 58° F.
Temperature—wet-bulb ..... 58° F.
Relative Humidity..... 100%

DUST ELIMINATED BY DAMP WALLS.

The entire absence of dust was surprising. This has not been entirely confirmed by later tests which show dust but in very slight quantities. While the report shows absence from odors this is not entirely correct, as there was a slight typical damp tunnel odor, although the latter is not unpleasant and disappears when the air is heated. The report ended with the following statement:

"In my opinion the introduction of tunnel air in this room is a decided asset because of the absence of dust, freedom from bacteria and the cooling effect it has in the room."

Another test of tunnel air used for cooling an engine room in one of the large office buildings was made in Au-

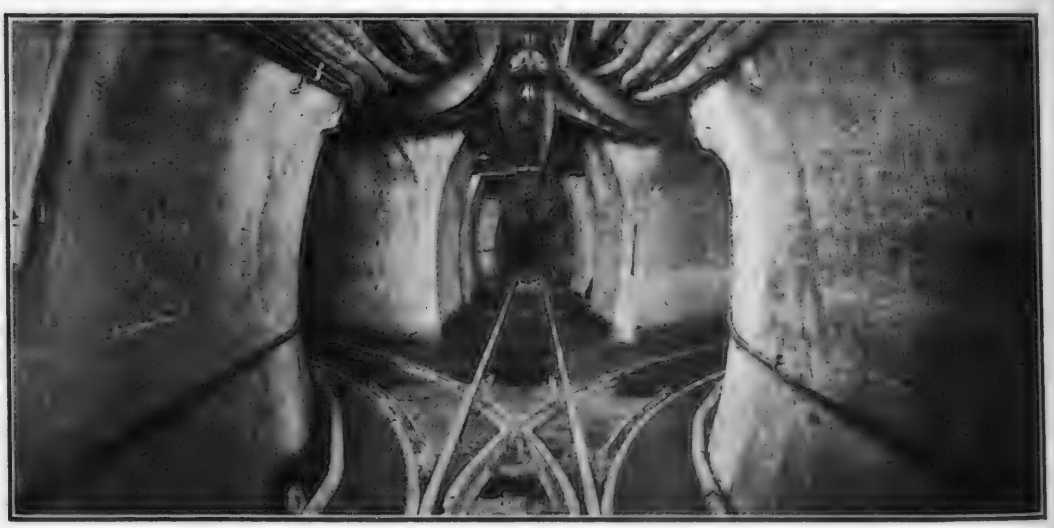


FIG. 3.—STREET INTERSECTION IN FINISHED TUNNEL.

gust, 1916, with an outside temperature of 97° F. The following are the results of this test:

Dust ..... Very slight
Bacteria ..... None
Odors ..... Typical, as noted in previous report.
CO_2 content..... 4.5 parts per 10,000 parts of air.
Dry-bulb temperature..... 66° F.
Wet-bulb readings were not taken at this test.

The dry-bulb tests noted in the report were taken at the entrance to the tunnel from the boiler-room and the reading is 10° higher than the actual tunnel temperature because of heat radiation from the boilers.

The odor of air from the tunnel was not particularly unpleasant and seemed to disappear entirely after the air had been raised to a temperature of 70° to 80°. It was almost impossible to detect the odors in the engine room or in the theatre or basement restaurant which were tested at a somewhat later date.

The cooling effect of the tunnel air so much desired in this boiler room was lost to a great extent, owing to the improper location of the intake and to the method of installing the main supply duct. The intake was placed close to the tunnel eye, resulting in the introduction of a large amount of boiler room air with the air from the tunnel. The supply duct extended uninsulated over the tops of the boilers, where the temperature was 137°.

If the equipment had been properly installed, with the intakes so constructed that they would supply air from the tunnel uncontaminated from air in the boiler room, and the supply duct properly insulated where it passes through the upper portion of the engine room, much better results would have been obtained. As it is, with an outside temperature of 97°, the engine room temperature was only 103°, a very slight increase when we consider the number and size of engines operating in this room.

FIG.—4.—EXCAVATION FOR CHICAGO FREIGHT TUNNEL.
Cross Shows Opening Which May Be Utilized for Air Supply.

In next month's issue Mr. Wilson will discuss the use of tunnel air from the Chicago Freight Tunnel for cooling theatres, giving the results of tests in this connection, and the comparative cost to obtain the same results with standard equipment.

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NOTICE has been served on the New York City Department of Education by the New York City Department of Health which amounts, practically, to an order to show cause why the present practice of ventilating public school buildings by mechanical means should not be abandoned in favor of the open-window method. Thus is resurrected an old-time controversy between the natural and mechanical ventilation advocates, but this time the agitation is more than academic; it has teeth in it. It means, if put through, that hundreds of thousands of school children are to live, during their school terms, under conditions that were familiar enough to those of a generation ago. It means that such an example on the part of a large city like New York could not fail to have a powerful, if not a decisive, influence on the attitude of similar authorities in other cities. Finally, it means one of the most destructive blows to modern ventilating practice that the heating and ventilating trade and profession have ever been called upon to meet.

The immediate developments that have brought about this condition are presented on another page of this issue. Back of these, however, must be mentioned the apathy on the part of the profession in meeting the claims of the open-window advocates with more than negative arguments. This stand has only served to widen the breach that separates the two schools of thought on this subject. What is needed is some basis of bringing the two opposing camps closer together and this, we believe, is being furnished at the present time by the Chicago Commission on Ventilation which has shown that the conditions to be secured are the important thing, rather than the means of securing them.

It is claimed by some that air tests are not within the province of the ventilating engineer, that it is for the physiologist to find the conditions that must be met and that the engineer's work is accomplished when he designs apparatus to meet those conditions. The whole point, however, is whether his apparatus does meet the conditions for which it is designed. It is notoriously true that, as ordinarily operated, it does not. Here is the real problem confronting the heating engineer; how to provide that his carefully-designed scheme in which, we will say, he has fully met the conditions of temperature, humidity, air motion, and the rest of it, is not allowed to be neglected and made worse than useless by improper operation.

We dare say that if the mechanical equipments of school buildings could be operated by their designers we would soon cease to hear the cry that present-day ventilating practice is on the wrong track. In the meantime one might almost wish that the health board would have its way in this matter just to see the reaction that would inevitably follow the adoption of open-window ventilation in a climate like that of New York.

THE MOVEMENT TO ELIMINATE MECHANICAL VENTILATION IN NEW YORK CITY'S PUBLIC SCHOOLS

Radical Action Taken by the New York City Department of Health Based upon Classroom Tests in Twelve School Buildings.

At periodic intervals the exponents of open-window ventilation obtain the front of the stage to proclaim that the present-day method of ventilating buildings by mechanical means is not sufficiently superior to the open-window method to warrant the outlay for the elaborate systems usually installed.

The latest "bombshell" of this sort has been thrown by the New York City Department of Health. In a letter addressed to the New York City Department of Education attention is called to some recent tests of school buildings, some of which were mechanically ventilated and some ventilated only by opening the windows, which apparently show that the prevalence of respiratory diseases is lower when the open-window method is used. The letter concludes with the statement that these tests indicate that it is not necessary for the Department of Education to plan for mechanical ventilating systems in its proposed new school buildings.

While no school construction is contemplated for the present in New York City, plans have been or are being drawn for a number of schools, so that the matter is one that requires an early decision.

In view of the possible consequences of such a step, which would involve the flashing of the word throughout the country and abroad that New York City had abandoned mechanical ventilation for its schools, the action of the New York Health Board is recognized as sufficiently serious to engage the attention of the heating engineers' society, acting, for the time being, through the New York Chapter of the society.

On the call of President P. H. Seward of the New York Chapter a meeting of the chapter's officers and others was held September 13 at the society's headquarters which resulted in the appointment of the following committee "to investigate and report upon proper methods of ventilation of classrooms of schools":

Perry West, chairman; A. S. Armagnac, W. H. Carrier, F. T. Chapman, W. L. Fleisher, R. H. Keith, D. D. Kimball and Arthur Ritter, with H. C. Meyer, Jr. and A. K. Ohmes acting in an advisory capacity.

It was also decided to make the October meeting of the New York Chapter an occasion for discussing this subject in detail.

THE TESTS IN QUESTION.

Due to the importance which has been assigned by the Department of Health to the tests referred to, it will be interesting to recall their principal features. They were made in 1916 by the Bureau of Child Hygiene, Department of Health of New York, in co-operation with the New York State Commission on Ventilation. The commission had full control of the selection of classrooms with reference to the type of ventilation to be included, the preparation of forms for recording observations relating to ventilation, the supervision of methods used in obtaining all data concerning ventilation and the final checking up and analysis of the data on ventilation. The Bureau of Child Hygiene had supervision of all other details of the plan.

The inquiry consisted of two complete studies. The first period lasted from February 19, 1916 to April 8, 1916. The second study began November 4, 1916 and extended to January 27, 1917. In 1916 eight schools were studied and in 1916-1917 twelve schools were selected. For the study of 1916, 2541 children were under observation and for the 1916-1917 study 2992 children were observed. Eighty-six per cent were from eight to eleven years old. The children were grouped in 58 classrooms in 1916 and in 76 classrooms in the study of 1916-1917. They were of the same age in both studies, from the same localities and of the same nationalties, but an entirely different group were studied each time.

THREE TYPES OF VENTILATION USED.

It was decided that three types of ventilation should form the basis of the study:

1. Type A. These were the so-called cold, open-window classrooms, ventilated by natural means. It was the desire to have the temperature kept at 50° F. This, however, was found to be impossible, owing to variations in the weather, and it therefore ranged from 50° to 60° and occasionally higher.

2. Type B. These were moderate-temperature classrooms, kept between 60° and 70° F., averaging about 68° F. Ventilation was wholly by open windows. Some rooms had gravity exhaust ducts while others did not.

Window deflectors were used in only one room in the 1916 study, while in the 1916-1917 study window deflectors were installed and used in all rooms.

3. Type C. These rooms were of the same moderate temperature as in Type B, that is, averaging 68° F. Ventilation of the classrooms was by the plenum fan system installed in the buildings, the windows in these classrooms being kept closed.

Records were made by a corps of nurses at each school session of absences from all causes, absences from sickness other than respiratory, absences due to respiratory sickness, respiratory sickness occurring among pupils in attendance at school, temperature of classrooms at each school session, humidity of classrooms at each school session, and sensations of observers at each school session as to temperature, moisture, odor and air motion in the classroom. The record of air conditions was made at eleven o'clock each morning and each afternoon at the end of the period of study immediately before aerating the room for the recreation period. All data were recorded under the items of odor, temperature, moisture, air motion, and air vents. The temperature was taken with the dry and wet bulb with the sling psychrometer in the center of the room, about 3 to 4 ft. from the floor, and the humidity was computed therefrom by standard methods.

There were 197,977 pupil session units in the 1916 study and 317,881 pupil session units in the study of 1916-1917. The data obtained showed that there were 506 more pupil session absences due to respiratory sickness in Type C (the mechanically-ventilated classrooms at 68°) than in Type B (the open-window classrooms at 68°), and 983 more pupil session absences due to respiratory sickness in Type C than in Type A (the open-window classrooms at 50°). Also, there were 7,257 more pupil sessions of respiratory illness occurring in pupils in attendance at school in Type C (the mechanically-ventilated classrooms at 68°) than in Type A (the open-window classrooms at 50°) and 9,170 more in Type C than in Type B (the open-window classrooms at 68°).

It was also shown by the data that in absences from school of children who are ill with respiratory diseases, Type C (the mechanically-ventilated classrooms at 68°) has the highest percentage in both studies. Types A and B (the open-window classrooms) show variation but in both instances are distinctly lower than in Type C.

The respiratory illness among pupils in attendance at school was found to be higher among the children of the Type A (open-window classrooms at 50°) than in Type B (open-window classrooms at 68°) while both remain lower than in Type C (mechanically-ventilated classrooms at 68°). As an explanation of the excess of respiratory sickness in Type A over Type B, attention is called to the factor of temperature of 50° in Type A and 68° in Type B. In this study the children under observation wore only their ordinary clothing, no extra wraps being provided. Both of these types were open-window classrooms, the essential difference being in the temperature.

Based on these and other data obtained in the investigation the Bureau of Child Hygiene reached the following conclusions:

1. In the closed-window, mechanically-ventilated type of classroom kept at a temperature of about 68° F. the rate of absences from respiratory diseases was 32% higher than in the open-window, naturally-ventilated type of classroom kept at the same temperature (about 68° F.) and about 40% higher than in the open-window, naturally-ventilated type of classroom kept at a temperature of about 50° F.

2. In the closed-window, mechanically-ventilated type of classroom kept at a temperature of about 68° F. the rate of respiratory diseases occurring among pupils in attendance was 98% higher than in the open-window, naturally-ventilated type of classroom kept at the same temperature (about 68° F.) and about 70% higher than in the open-window naturally-ventilated type of classroom, kept at a temperature of about 50°.

3. It was found in this investigation that the relative humidity of classrooms, whether ventilated by natural or mechanical means, was not a causative factor in the occurrence of respiratory illness among school children.

4. It was found in this investigation that the occurrence of respiratory diseases among school children was not influenced by sex.

The tests here described were made the subject of a paper by S. Josephine Baker, M. D., director of the Bureau of Child Hygiene and presented before the Sociological Section of the American Public Health Association at Washington, In October, 1917. The paper has now been reprinted by the New York City Department of Health as No. 68 of its "reprint series."

COMMENTS ON TESTS.

In discussing some of the features of these tests, Perry West calls attention to the fact that classrooms with mechanical ventilation and consequently more or less air motion are compared with those of the same temperature having open-window ventilation and presumably less air motion. "We would naturally expect," he states, "poorer results from the mechanically-ventilated rooms under these circumstances, even with the same per-

centage of relative humidity. It is not stated, however, whether or not the same amount of relative humidity was carried, and if no moisture was added in either case, the mechanically-ventilated room would naturally be much drier, due to the more rapid air change and less opportunity to absorb moisture from the pupils.

"In the second place, open windows at 50° F. are compared with a mechanically-ventilated room at 68°, which is, without question, a futile comparison, as either type of room would naturally be more healthful at 50° than at 68°. In neither case is the temperature of the incoming air taken into consideration. This inital temperature has a marked influence on the relative humidity of the air in certain parts of the room, compared with the average humidity of the entire room.

The Metric System Not Essential in Export Trade.

Basing its conclusions on more than 1400 answers to a questionnaire which was sent to several thousand manufacturing concerns in the United States, some or all of whose products are shipped to countries which are supposed to use the metric system, F. A. Halsey has submitted a report to the American Institute of Weights and Measures which shows that the export trade of the United States is now conducted by the English system and that there is no strong desire or necessity for changing over to the metric system. Mr. Halsey's report constitutes the principal portion of the report of the American Society of Mechanical Engineers' Committee on Weight and Measures.

It is shown, among other things, that 82% of our exporters to metric countries use the metric system not at all in production, while 14% use it partially and in ways that, when explained, are inconsequential; and 0.4% really use it exclusively.

The mechanical engineers' committee also notes that the British Government's Committe on Commercial and Industrial Policy after the war states, among other things, that:

Having given very full consideration to the subject, we are unable to recommend the compulsory adoption of the metric system in this country. In our opinion it is absolutely certain that the anticipated uniformity could not be obtaned for a very long period, if ever. There is, further, the serious objection that if we induced the above-mentioned countries to change over to the metric system, we should be surrendering to Germany the advantage which our manufacturers now enjoy over here, both in their markets and our own.

We are informed that even in France, which has made the metric system nominally compulsory for more than half a century, the "pouce" (or inch) is used in textile manufacture and numerous local measures still survive.

In referring to these considerations, we have to point out that there is no unanimity even as to the theoretical merits of the metric system as compared with our own. The practical argument that its adoption is desirable in order to secure uniformity in the markets of the world has been shown to be unfounded. We are not satisfied by any evidence which has been brought before us that trade has actually been lost to this country owing to the fact that the use of the metric system is not compulsory.

But to attempt to make the use of the system universal and obligatory in this country would cause great loss and confusion at a particularly inopportune moment for the sake of distant and doubtful advantages. We are convinced that, so far from assisting in the reëstablishment of British trade after the war, such a measure would seriously hamper it.

As regards the educational advantages claimed for the change, we have been referred to a statement quoted by the Select Committee of 1895 that no less than one year's school time would be saved if the metric system were taught in the place of that now in use. The information which we have received does not support that statement, and even if it were well founded, it must be remembered that for at least a generation, children would have to learn both the new and the old measures and how to convert from one to the other.

It is often popularly supposed that the introduction of the metric system would render possible the immediate sweeping away of many complicated and varying weights and measures. As we have already indicated, this belief is, in our opinion, wholly fallacious.

We are not convinced that the metric system is, upon the whole, even theoretically superior to the British system, and we are satisfied that the practical objections to the proposed change are such as decisively to outweigh any advantages which are claimed for it.

BUILDING CONSTRUCTION GIVES WAY TO WAR WORK

Important Rulings Showing the Conditions Under Which, for the Present, General Building May Proceed.

The building industry, it has been definitely announced, must make way for the present, at least, for the more urgent war work undertaken by the government. This ruling has been made by Bernard M. Baruch, chairman of the War Industries Board, and the reasons therefor given in a statement submitted by Mr. Baruch, September 21, to the United States Senate in reply to the Senate's recent request for information concerning the authority of the War Industries Board to stop or hold up the construction of private or public buildings.

The resolution of inquiry was passed by the Senate at the suggestion of Senator Calder of New York after the War Industries Board had taken steps to stop the carrying out of New York's $9,000,000 school building programme. Mr. Baruch said in his reply that the authority for the board's action comes from the Priority Shipment Act instructions issued by President Wilson to the board to see that building materials go only to essential industries.

Mr. Baruch then stated:

"Iron and steel are a necessary part of every completed building. They are necessary for plumbing, heating, ventilating, piping, hardware and mechanical equipment. The direct and indirect war needs of this country and of our allies for the last six months of the current year already exceed 21,000,000 tons and the country's total output for the first six months was less than 17,000,000 tons. The unavoidable result is that iron and steel cannot be used for non-war or less essential purposes.

"The United States Fuel Administration, finding that the production of building materials consumed upwards of 30,000,000 tons of fuel per annum, and that there was a shortage in the fuel necessary for our war programme, curtailed very materially the fuel allowed for building materials. The continued production of building materials for non-war and less essential projects would now necessarily be at the expense of productions which our war programme require.

"The railroad administration finds that 25% of the total tonnage moved by the railroads is building material. It is absolutely essential that the portion of this tonnage which represents materials not needed for war or essential purposes should be displaced by tonnage which is.

ACUTE LABOR SHORTAGE.

"The United States Employment Service finds that there is an acute shortage in the labor needed for the war programme. It is absolutely essential that labor which may now be idle, or which may be engaged on non-war or less essential work, should be employed upon work which will contribute toward winning the war.

"It is, therefore, evident that the building and construction field furnishes an instance calling imperatively for the exercise, by the War Industries Board, of the duty, with which the President charged it, of conserving the resources and facilities of the country for war purposes, of determining necessary priorities in production and in delivery, of obtaining access to materials in any way preempted and of anticipatng prospective war needs.

"It is clear that there is not enough iron, steel, transportation facilities, fuel and labor to supply the direct and indirect war needs of the country and the non-war needs also, and that the resources and facilities used in non-war and less essential building projects can only be applied thereby, taking them from the war needs.

"It is not only the policy, it is the clear and simple duty of the War Industries Board to see that the war programme of the country is met, and this programme must be met now, when its needs are upon us. This duty must be fulfilled, even if its fulfilment entails industrial loss in this country, as it does human loss abroad."

The status of the building industry has been uncertain for some time. In the spring it will be recalled the impression got abroad that the government was discouraging building activity on the part of the general public. This impression was corrected by Secretary of the Treasury McAdoo who stated that "the Treasury Department has at no time taken any such attitude, nor has it ever advised banks or mortgage companies against loaning money upon mortgages on real estate."

Following the organization of the National Federation of Building Industries last July close touch has been maintained by the building industry with the government. A notable meeting was held in Washington Au-

gust 24 when representatives were present of six of the governmental authorities under which the industry is now working. These include the War Industries Board Priorities Committee, War Industries Board (Resources and Conversion Section), the Railroad Administration, the Fuel Administration, U. S. Employment Service of the Department of Labor, and Capital Issues Committee of the Federal Reserve Board. It might be added that the conference was brought about through Chairman Baruch, of the War Industries Board, and President Wheeler, of the Chamber of Commerce of the United States.

One of the first suggestions made by the Federation of Building Industries was that its executive committee act as advisors or specialists to the government, as well as a clearing house for the accumulation of information and of the problems of the industry itself. To the government, it was pointed out, such counsel would be useful in assuring action based upon an understanding of practical conditions, and the industry would be given a greater feeling of confidence that it had been afforded a full hearing. Furthermore, the committee, through such contact, would be able to convey to the industry generally a more vivid perception of necessities for war sacrifice as seen from the government point of view, and communicate them to the industry in its own language and through its accustomed channels.

THREE PRINCIPAL DUTIES FOR BUILDING INDUSTRIES.

Three principal duties under war conditions, it was stated, seem to devolve upon the building industries:

1. Adequate resources in plant, material and service must be made promptly available for war needs and the government's building program speeded with economy.

2. Plant and organization not now devoted to war work must be converted to war work to such extent as may be feasible and desirable.

3. Labor, superintendence, plant and material not now applied to war work when not needed by the government must be maintained if it is to be subsequently available for governmental use, and should be employed in meeting the construction needs of the civil population, maintaining the prosperity in all zones of those who might otherwise be idle and non-productive, particularly in the West, thereby preserving the industry as a national facility.

The central War Service Committee of the National Federation of Building Industries, it was formally announced, speaking with authority for the whole industry, is prepared to undertake this work through its executive board and its sub-committees.

INDUSTRY PREPARED TO MAKE WAR SACRIFICES.

The building industries representatives made it plain that the industry does not seek any means of shirking the duty or slighting the privilege of war sacrifice. The statement was frankly made, however, that great confusion apparently has existed up to the present time in the public mind as to the governmental policy regarding civil construction. This policy, as commonly understood, is that no civil construction should be sanctioned or permitted which will interfere with the national war programme, but that at such time as the wealth-producing business and personal life of a community need civil construction, it should not only be permitted, but sanctioned—subject always to the provision that it must not interfere with the war programme.

If the government intends to be understood as discouraging any civil construction whatever, it can only be due to an official supposition that there is no civil construction which does not interfere with its war programme.

This is the crux of tne situation and on this point the committee of the building industries stated among other things:

"Is such a supposition warranted by the facts? It might be true in some sections, but not in others. It might be true at one time and not at another. It is doubtful whether the readjustment of the building industry to the handling of war work would ever—even if the war was continued for several years—result in the complete absorption of all surplus materials suitable for construction needs of the civil population throughout the United States. It is a fact that general conditions, due to the war, both before and since our participation in it, have already curtailed building operations to the irreducible minimum. Further curtailment must imperil the life of the industry.

"There is no question but that steel and some other materials will not be available for building purposes until the war is over. Construction involving steel has been abandoned. This fact is everywhere recognized, and projectors and contractors have stricken steel construction from their program. The government has no need to discourage this class of civil construction, as filling its own requirements has automatically shut off the supply. In like manner, financial, transportation and labor conditions have further shut off the supply.

"However, while these materials will not be available in all probability, until peace returns, other materials exist in surplus. Lum-

ber, for instance, on being cut into ship lengths, leaves an enormous by-product of lengths suitable for building.

"As to fuel, many manufacturing plants use water power, and others use refuse for fuel. In others, adjustments by zoning and consolidating can be effected which will save both fuel and transportation. Substitutes can be devised for materials which have been used in the past, and new sources of material drawn upon which will not only save fuel and transportation, but increase supply.

"Notwithstanding the fact that labor has been taken from building and kindred industries for military and direct war needs, and notwithstanding the fact that war industries are short of labor and that the manpower question is the paramount question confronting us, reports from the Department of Labor, while indicating through a comparison of monthly applications for employment in the various trades, that there is a continued shortage of common labor, mechanics and skilled farm labor, nevertheless indicate that there has been a continued surplus of skilled artisans in the building line throughout the country except in certain congested districts—notably in Atlantic Coast States and certain points on the Pacific Coast.

"This question of labor for building construction for civil purposes might properly be classified as one for consideration at the individual locality, to be taken up as occasion requires. The condition, however, exists that many efficient building artisans are mature in years and well past the age of mental and physical adaptability, and bound to local labor markets by family and property ties and by climatic and physical conditions, who cannot be readily assimilated into those industries so highly essential for war needs.

"Moreover, even if only necessary building is to be carried on, labor must be available for such necessary building as may from time to time and place to place be defined as necessary, and skilled labor to handle such necessary work might well have priority consideration over less essential industries.

"Neither does the transportating of building materials increase the great strain on transportation facilities at the terminal. For the most part building materials never approach terminals or chief junctions, and often such materials can be carried in cars which are returning from a loaded trip." (The development of inland water-ways was also mentioned.)

"Building does not lock up funds, but transfers them from one hand to another. Material from the raw is raised in the form of structure which can be taxed and on which money can be borrowed. It earns its own upkeep and replacement beside the return which the capital would be earning if it were saved. Rent is the first cost of all necessities and civil construction must continue if we would mitigate the increased cost of living.

It is already apparent that the need, especially for dwellings, has in many parts of the country seriously overrun the supply."

TWO CONCRETE PROPOSALS MADE BY INDUSTRY.

The statement of the building industries representatives concluded with two special proposals.

First, that the government through its existing agencies avail itself of the knowledge, experience and ability of the men in the building industries to advise with the proper government agency in each region on all requests for building permits.

Second, that the War Industries Board, the Railway Administration, Fuel Administration, Capital Issues Committee and other governmental agencies which may have occasion from time to time to issue rulings and regulations which may bear directly upon the building industry, call the building industries committee in conference before such rules and regulations are adopted and promulgated. Any necessary curtailment, it is added, will be regarded with much more satisfaction if there exists a clear understanding of just what is needed and why.

RESULTS OF THE CONFERENCE.

In a statement made by President Ernest T. Trigg, of the National Federation of Building Industries, on the results of the conference, he said that the representatives of the federation left the meeting with a feeling of hope that its suggestions will be put into effect in the near future. He said that each of the government representatives present at the meeting discussed frankly and at considerable length the view point of the government, as impressed upon each through his own special activities. Great emphasis was laid by them upon the necessity for the production of enormous quantities of supplies for the military programme and upon the fact that these supplies must be provided now, and not a year of two hence. The question of man power was emphasized as being the most important single consideration in the supply equation, particularly in its bearing upon fuel production.

Later it was announced that an agreement was reached which provided that building materials should be furnished only for war projects, and that all other building projects must have official sanction in the shape of a

permit before materials could be supplied to them.

A result of this agreement in New York City, for instance, was that the sale of building materials was suddenly estopped and a large number of building projects, which were partially completed, were held up. Members of the Merchants Association of New York appealed to it for assistance, pointing out that practically all building operations throughout the city had been paralyzed. Protest was immediately made to Washington and the situation was reconsidered there in light of the facts presented. Official permission has since been issued for the continuance of buildings now in course of construction until further notice without permit, but that new construction of all kinds must be authorized by permits issued from the Building Material Section of the War Industries Board after favorable recommendation from the State Council of Defense.

GOVERNMENT'S WAR PROGRAMME CAUSES TRADE EXTENSION COMMITTEE TO LIMIT ITS ACTIVITIES

Elaborate Plans for Carrying on a National Educational Campaign to Await Conclusion of Peace.

As a result of the government's war programme, the Trade Extension Committee, which has been conducting a campaign during the past few months for "new equipment for old buildings," has decided to limit its activities, for the present, to the maintenance of its organization and the preparation of plans for an extensive and continued educational campaign, to be launched on the conclusion of peace with Germany.

This important action was taken at a meeting of the committee in Chicago, September 5, when the question came up whether the organization would proceed with its work and employ a commissioner, to have charge of a bureau to be known as a "Trade Extension Bureau," or to let this project remain in abeyance for the period of the war.

In reporting on the work already conducted by the committee, Chairman William J. Woolley of the finance sub-committee, stated that the planning of the campaign for "building business from old buildings" "has unquestionably brought home the fact that the selling forces of the trade, meaning, of course, the plumbing and heating contractors, are wholly unprepared for such activities. Close study of the question of sales has also revealed the fact that the products represented by this organization are greatly undersold even during normal times."

It is therefore necessary, said Mr. Woolley to properly train the men who naturally come in contact with the ultimate consumer. He urged the establishment of a permanent organization, to be in charge of a competent man, to institute and execute a progressive campaign of education.

He pointed out that when the prominence and importance of this industry is seriously considered, it is hard to realize that we are the only prominent line in this country that does not have a bureau of education and promotion whose function is to devise plans and direct campaigns for increasing the sales of these essential products.

OUTLINE OF ACTIVITIES OF PROPOSED TRADE EXTENSION BUREAU.

Mr. Woolley proceeded to give detailed suggestion for the work of the proposed "Trade Extension Bureau," as follows:

FIRST.—ACCOUNTING FOR THE CONTRACTOR.

A. By compiling a complete bookkeeping system.
B. By compiling a cost system.
C. By compiling short, efficient methods of estimating.
D. The starting and stopping point of credit extension by the contractor.
E. Collections.
    1. Proper contract forms.
    2. Trade acceptance.
    3. Collection forms.
F. Financing a business.

SECOND—PROMOTION

A. How to build personality.
B. How to construct and use a showroom.

C. How to construct and decorate a show window.
D. Salesmanship.
E. Business location.
F. How to prepare and use circular letters literature.
G. How to successfully stage a selling campaign.
H. How to construct and use a follow-up system:
   1. On prospects.
   2. On estimate submitted.
J. How to secure the co-operation of journeymen (selling service).
K. How to secure the co-operation of manufacturers, jobbers and salesmen.
L. Establishing of National Sales weeks.
M. Advertising.
N. How to secure the co-operation of competitors.

THIRD—EDUCATION

A. The distribution of condensed printed pamphlets covering each of the above topics prepared by the commissioner.
B. Changing public prejudice.
C. Substitution and true costs of so-called cheap materials.
D. Interchange of views between manufacturers, jobbers and contractors.
E. Compiling of an official list of plumbing and heating contractors.
F. Lectures by the commissioner at all state and national meetings of the trade and salesmen's meetings.
G. Securing enthusiastic co-operation of local associations.
H. Promotion crews to make experiments and educational sales drives.

Following the reading of Mr. Woolley's report, James N. Conran asked if this movement could be financed. He requested the representatives of the various organizations present to give their views.

J. F. Evans, speaking for the Eastern Supply Association, stated that the work of the Trade Extension Committee was a worthy movement and that it should be continued along practical lines. He recommended, however, that for the present the work be confined to that of an educational character, as it was contrary to the wishes of the Government to create new business. He quoted Judge Parker, saying that materials would be available for needed repairs and the maintenance of present equipment and not replacements or improvements.

J. R. Steneck, president of the Central Supply Association, stated that he felt like Mr. Evans, and thought it was necessary to move cautiously and not do anything which might conflict with the purpose of the administration, namely, "the winning of the war." "This is a time when we must subordinate business and personal action to the winning of the war," said Mr. Steneck. He then gave numerous instances of what other industries have been compelled to do in the way of sacrifices and retrenchments in business, and he was disposed to believe that it would be better to defer the matter, but was in favor of carrying on the work of the Trade Extension Committee in a limited way.

C. V. Kellogg, in discussing the question, stated that there is no doubt we are facing a serious problem, and continuation of the work of the committee would be very important so far as collections were concerned. He was in favor of continuing the work of the committee along educational lines. C. B. Nash advised that it would be necessary to collect the money or let the committee die, and if the move were made the work might never be revived. He felt there should be an intermediate course so that after the war the work could be resumed to the fullest extent.

Mr. Evans then suggested that the Publicity Committee might fix a minimum amount of money to work on to keep the movement alive, and that this proposition could be submitted to the fall meetings of the different associations interested in this movement. Mr. Conran then said that the greatest benefit so far accomplished has been the co-operation between the manufacturer and jobber on one hand and the plumber on the other, and he hoped that this would be continued until after the war and thereafter.

Mr. Woolley said that he was of the belief that if the money could not be raised now, the case would be hopeless. He said: "It will take twelve to eighteen months to get the bureau properly started," and he told of other industries that have done very successful work on educational and 'trade extension' lines. Continuing, he said: "Everyone has admitted the necessity of the reforms as advocated by the committee, and they can only be brought about through an establishment of a central bureau. There is no question that if this move is backed up financially by manufacturers and jobbers, that it will benefit their investment eight thousand times over."

W. M. Webster, representing the National Association of Brass Manufacturers, stated that he believed that this was not the time to extend business in view of the Government's wishes, but thought it worth while to keep going if it could be done for a nominal expense.

Louis Bruch was the next speaker to enter into the discussion. He said that "extension" means carrying on, and that the work of the Trade Extension Committee meant not simply a movement toward immediate but rather

a betterment of business methods, the necessity of which have existed for many years. He suggested that the name of the committee be changed to that of the Trade Educational Committee, its purpose being the betterment of business methods.

After luncheon the afternoon meeting was called to order. It was suggested that the recommendations of Mr. Sullivan and Mr. Bruch to confine the committee's work to educational advancement, be presented for consideration at the next regular meeting of the Trade Extension Committee.

Mr. Kellogg moved that the work of the Publicity Committee be approved and that the financing of this movement be referred back to the Finance Committee, and that they take the matter up with the different associations and recommend the raising of a sum of money sufficient to carry on the work of the committee and keep it in existence until a more propitious time. Mr. Kellogg was unable to state exactly how much money was needed, but he was confident that a nominal sum could be raised for carrying out a modified program and that the balance of the work could be formulated to fit the purse.

The following members were present: L. McNamara, president, National Association of Master Plumbers; Paul Blatchford, secretary, Central Supply Association; J. F. Conran, Standard Sanitary Mfg. Co.; C. V. Kellogg, Kellogg-Mackay Co.; B. O. Tilden, American Sanitary Works, Trenton, N. J.; Publicity Committee—William J. Woolley, chairman; C. H. Nash, Standard Sanitary Mfg. Co.; M. R. Ebersole, American Radiator Co.; E. J. Hanley, Educational Committee of the National Association of Master Plumbers; J. T. Sullivan, Thomas Maddock's Sons Co., Trenton, N. J.; Joseph F. Evans, Eastern Supply Association; W. M. Webster, National Association of Brass Manufacturers; J. R. Steneck, president, Central Supply Association; George Mehring, Heating and Piping Contractors National Association; Louis Bruch, American Radiator Co.; Trade Press—O. T. Carson and W. H. Burquest, *Domestic Engineering;* Peter M. Munn, *Plumbers' Trade Journal;* Charles H. Bishop, *Metal Worker, Plumber and Steam Fitter.*

The War and the Heating Engineer

U. S. Standards for Industrial Housing.

Government standards for war housing of permanent construction have been issued and while they are not intended as inflexible requirements, failure to conform to them is not likely to be accepted unless supported by very strong reasons. Local building codes, housing laws and similar ordinances are to be followed except where they permit lower standards than those set forth by the government.

The types of houses covered by the standards include single-family house, two-family house, single-family house with rooms for lodgers or boarders, lodging-houses for men, hotels for men, lodging-houses for women, tenement houses and boarding houses.

One of the general provisions is that no living quarters are to be in the basements. For cooking, gas is preferred, but flue for stove coal is to be provided, all flues to be lined.

An unusual provision is for "roof air space." It is provided that "in every house there shall be a minimum clear air space of 8 in. between the ceiling and the roof, this space to be provided with adequate waterproof openings for ventilation, at both ends if practicable."

Every room is to have at least one window opening directly to the outer air, each room to have a window area of not less than 12 sq. ft. Cross ventilation as direct as possible is to be provided for all rooms through windows, transoms or doors.

Type 1 (single-family house), Type 2 (two-family house, or "two-flatter, one family upstairs, one down) and Type 3 (single-family house with rooms for not more than three lodgers or boarders) are to comply with the following heating requirement: "Provision to be made for heating houses. If not otherwise heated, bathroom to be heated from kitchen stove."

Type 4 (lodging house for men) and Type 5 (hotel for men) are to be heated as follows: "Except where connected with a central plant, provision to be made for independent heating."

Type 6 (lodging house for men) and type 7 (hotel for women) also have the same heating provision, that "except where connected with a central heating plant, provision to be made for independent heating."

Government Housing Plans.

In addition to the $50,000,000 allotted to the Shipping Board for housing purposes, the Department of Labor is well along with its plans for utilizing the $100,000,000 appropriated for similar purposes. In a statement issued by the department it is shown that even with a sum of this magnitude it is manifestly impossible for the Federal Government to assist every community which is embarrassed with a housing shortage. In the following industrial centers developments of varying degrees of magnitude have been projected:

Alliance, O.; Aberdeen, Md.; Bethlehem, Pa.; Bridgeport, Conn.; Bath, Me.; Bettendorf, Iowa; Butler, Pa.; Charleston, W. Va.; Dayton, O.; Davenport, Iowa; Erie, Pa.; East Chicago, Ind.; Elizabeth, N. J.; Florence, Ala.; Gary, Ind.; Hammond, Ind.; Indiana Harbor, Ind.; Indianhead, Md.; Lowell, Mass.; Milton, Pa.; Madison, Wis.; Mare Island, Cal.; Norfolk, Va.; New Brunswick, N. J.; New London, Conn.; Niagara Falls, N. Y.; Niles, Ohio; Newport, R. I.; Portsmouth, N. H.; Puget Sound, Wash.; Philadelphia, Pa.; Quincy, Mass.; Rock Island, Ill.; Seven Pines, Va.; Sheffield, Ala.; Sharon, Pa.; Staten Island, N. Y.; Tullytown, Pa.; Tuscumbia, Ala.; Watertown, Mass.; Watervliet, N. Y.; Warren, Ohio.; Waterbury, Conn.; Woodbury, N. J.

At Bridgeport, Conn., the Bridgeport Housing Company has obtained a Government loan of $3,000,000 to build houses for 608 families in that city. The Cauldwell-Wingate Co., New York, is the contractor. Additional housing plans in Bridgeport will entail an outlay of $2,000,000.

At Quincy, Mass., the industrial Housing Commission is building 21 dormitories, one mess hall and one recreation building for employees of the Fore River works of the Bethlehem Shipbuilding Corporation.

At Harriman, Pa., near Bristol, construction has begun of 200 homes for employees of the Merchant Shipbuilding Corporation.

At Bath, Me., a project is under way for building 125 houses for employees of the Bath Iron Works.

Details of other housing developments planned by the Industrial Housing Department include the following: Newport, R. I., $300,000 housing project, Clarke & Howe, Providence, architects; Philadelphia, 800 new dwellings for workmen on Oregon Avenue, to cost $3,500,000, Rankin, Kellogg & Crane, architects, Philadelphia; Erie, Pa., 1000 two-story homes for workmen, A. H. Spahr, architect, Pittsburgh; Elizabeth, N. J., new homes for workmen to cost $500,000, Charles W. Oakley & Son, architects, Elizabeth; Niagara Falls, new homes for workmen to cost $6,000,000, Dean & Dean, architects, Chicago; New Brunswick, N. J., 500 dwellings for workers in the plant of the Wright-Martin Aircraft Corporation, involving a cost of $1,500,000.

At Swedland, Pa., 61 two-story houses are being built for the Alan Wood, Iron & Steel Co., of Philadelphia, by A. B. & C. F. Millett.

At Gibbstown, N. J., 60 new houses will be built for employees of the E. I. du Pont de Nemours Co., of Wilmington, Del.

At Essington, Pa., the Westinghouse Electric & Mfg. Co., of Pittsburgh, has arranged for the construction of 300 2½-story brick and stucco dwellings for employees at its Essington plant.

Among the appointments made by the Bureau of Industrial Housing and Transportation in connection with projected housing developments, are the following:

Staten Island, N. Y.—Architects, Delano & Aldrich, New York; town planner, A. F. Brinkerhoff, New York; engineer, C. S. Pollock, New York.

Florence, Ala.—Architects, Warren & Knight, Birmingham, Ala.; town planner, Harold A. Caparn, New York; engineer, Julian Kendrick, Birmingham, Ala.

Sheffield, Ala.—Architects, Warren & Knight, Birmingham, Ala.; town planner, Harold A. Caparn, New York; engineer, Julian Kendrick, Birmingham, Ala.

Plans of War Department for Cantonment Extensions.

The following statement has been authorized by the War Department:

Expansions of camps and other changes at training centers have been decided on as follows by the general staff:

Camp Hancock, Ga., is to be a machine gun center and will be enlarged to accommodate between 55,000 and 60,000 men. The officers' training school, now housed in tents at this point, will be provided for in barracks and quarters similar to those already erected at other cantonments. The improvements for this purpose will cost about $2,000,000. This figure does not cover the increased cost for other construction that will be necessary to care for the increased number of men to be located at this camp.

It has been decided to make Camp Grant an infantry replacement camp to accommodate between 55,000 and 60,000 men. The present capacity of this camp is about 42,000. The alterations and additions made necessary by this change will be made after the division now located there is moved.

Field artillery firing centers are to be

located at West Point, Ky., Camp Jackson, S. C., and at Fayetteville, N. C. Options on sufficient land for this purpose have been secured at all these places. It is planned to locate six brigades at Fayetteville, six at West Point and four at Jackson.

It has also been decided to erect permanent buildings for the officers' training schools at present housed in tents at Camps Lee, Gordon and Pike. These schools have a capacity of about 6,000 men. The estimated cost of erecting barracks and quarters and doing other construction work at each of these schools is about $2,000,000.

War Savings Societies for Employees.

The Pioneer Division of the National War Savings Committee, representing the New York district, is urging the immediate establishment of war savings societies in every trade. Individual members will be asked to refrain from the purchase of non-essentials, not only in dress, food and fuel, but also in the daily extravagances.

Community Houses Instead of Monuments.

The erection of community houses as fitting memorials to the brave men, living and dead, who are saving the world for Democrack, is suggested editorially in *The American City* for September. "Liberty Buildings" is the name proposed for these structures, which, erected immediately after the war, would perpetuate the democracy of the camp and would serve as neighborhood gathering places for civic activities and fellowship for all the people.

Joseph Harrington, vice-president of the James A. Brady Foundry Co., Chicago, who is well known to members of the National District Heating Association as a contributor to the association's proceedings and discussions, has been appointed administrative engineer of the United States Fuel Administration for Illinois.

The Fourth Loan is the Fighting Loan.

As the campaign for the Fourth Liberty Loan nears its climax the American Army in France moves on toward Berlin. Under our own leaders the great American Army has won a notable victory.

The Fourth Loan must be a great success. The Fourth Liberty Loan is a fighting loan.

When our soldiers on the battle front are braving death, each one offering to make the supreme sacrifice for his country and the great cause, we who remain safely at home surely should give them every support, should make every sacrifice to strengthen them. If we can not fight ourselves we can make our dollars fight.

It is a great cause for which America is engaged in this war; it is a great struggle in which the very hope of the world is bound up that is being waged in Europe and on the high seas. It is an honor to have a part in it and all Americans, all of their lives, will be proud of the part they had in it or ashamed of their failure to do their part.

The Fourth Loan is a fighting loan. Every subscriber to the Loan strikes a blow for Liberty, for Victory.

Figuring Heat Losses from Compound Walls.

EDITOR HEATING AND VENTILATING MAGAZINE:

Referring to the Standard Data Sheets published each month in your magazine, will you kindly advise me regarding the coefficients in Data Sheet No. 1-D, published in the March, 1917, issue. Are the thicknesses given for the tile and stucco and for tile, stucco and plaster constructions intended as the entire thickness of wall, including stucco and plaster, or thickness of tile only?

Atlanta, Ga. A. F. G.

The figures given in the Data Sheets for tile, brick, etc., refer to the rough wall. To get the total finished thickness, the plaster and stucco must be added to the thickness of the rough wall. A 4-in. tile wall, plastered one side, would probably be from 4¾ in. to 5 in. thick and so forth.

Current Heating and Ventilating Literature.

Under this heading is published each month an index to the important articles on the subject of heating and ventilation that have appeared in the columns of our contemporaries. Copies of any of the journals containing the articles mentioned may be obtained from THE HEATING AND VENTILATING MAGAZINE *on receipt of the stated price.*

AIR CONDITIONING

Dry Air and Cold Steam. Frank Richards. 1000 w. Pwr Pt Eng—June 1, 1918. Relation of vapor and air in saturated mixture to temperatures and pressure. 20c.

HEAT INSULATION

Evolution of Heat Insulation. Austen Bolam. 2000 w. Pwr Pt Eng—June 1, 1918. Materials tried, combinations, test results, and present practice. 20c.

HEAT TRANMISSION

Some Recent Studies in Heat Transmission. Arthur J. Wood and Roy B. Fehr, with discussion. Ills. 40 pp. A S R E J1—March, 1918. Studies aiming to establish constants applicable to practical engineering problems. 40c.

HOT-WATER HEATING

Hot-Water Service. M. W. Ehrlich. Ills. 2200 w. Pwr Pt Eng—June 15, 1918. Method of calculating the required heating surface. 20c.

LEGAL DECISIONS

Recovery Under Contract to Install Heating and Ventilating Plant.

In an action against a city it appeared that in August, 1910, the plaintiff was awarded the contract for heating, by the hot-air system, and ventilating, a schoolhouse in the city. The following September a contract was made with one Morrison for the erection of the building, under which he was to furnish material and labor and do all the work except "heating, plumbing and painting." In November the system of heating was changed from hot air to steam. The plans for the building were filed as required by the Massachusetts statute sometime before, February 4, 1911, and on that day a state inspector of public buildings wrote to the architect in charge, disapproving certain parts of the plans. The inspector's certificate as to filing mentioned in the statute was never issued.

The building of the vent and heat ducts was a part of Morrison's contract. The ducts constructed by him, while apparently suitable for a system of heating by furnace, were not suitable in connection with a steam-heating system. The auditor found that Morrison was requested to build ducts proper for a steam-heating system and refused to do so.

The plaintiff contracted with the Wadsworth English Fleet Company to perform the work required to be done by him, with certain exceptions. All this work was completed in substantial compliance with the agreement, and it was found that the system for heating and ventilating furnished by the plaintiff conformed to all the rules of the district police, that the system was capable of furnishing a uniform heat of the degree called for by the specifications, and that the difficulty in ventilation was due solely to the insufficiency and defective construction of the ducts built by Morrison. There was a finding for the plaintiff and the defendant excepted. The Massachusetts Supreme Judicial Court, Ordway v. City of Newburyport, 119 N. E. 863, overruled the exceptions. The court held that a contractor engaged in the erection of a building is not required by the statute to file the plans; that is the duty of the owner or architect and his failure to comply with the statute does not deprive the contractor of his rights under the contract. The certificate mentioned in the statute is not a condition precedent to recovering by one who supplies material and labor for such a structure. The fact that the inspector had disapproved the plans submitted for the heating of the building—and that this fact was known to the plaintiff—did not deprive him of his right to recover if the work required by the plans and specifications was fully performed. It was found that there was no failure on the plaintiff's part to comply with all the terms of the undertaking. The defect was in the work done by the general contractor, who in building the schoolhouse carried out the original plan and constructed the ducts, as designed, for heating by a hot-air system.

The fact that the defendant was a municipal corporation did not, so far as the statute was concerned, prevent the plaintiff from recovering, nor did the fact that the system was designed and laid out by an engineer of the Wadsworth English Fleet Company, the subcontrator, who was not in the defendant's employ, disclose any fraud or deprive the plaintiff of his right to recover.

Reduction in Calorific Value as Increase in Charge for Gas.

Application having been made by the public Service Company of Northern Illinois for authority to change the present standard quality of gas, permission was granted by the Illinois Public Utilities Commission under certain conditions. The Commission found, among other things, that it was in the interest of the company and of its consumers that the calorific value of the gas furnished by it in the municipalities involved in the proceeding be reduced to one having an average of 565 British thermal units per cubic foot and otherwise in accordance with general order No. 20 of the Commission, and that, should the petition reduce the calorific value of its gas, the rates and charges therefore should be reduced as provided in the order.

New York School of Heating and Ventilation.

The opening of the New York School of Heating and Ventilation for its sixth annual session is announced by the secretary of the school, G. G. Schmidt. Classes will be held as in previous years on Monday evenings, in Room 511 of the World Building. Charles A. Fuller, M. E., continues as the instructor. No particular requirements as to education and mathematics, it is pointed out, are necessary for the first year course which meets at 7:30 o'clock. Before entering the advanced class, which meets the same evening at 5:45 o'clock, it is desirable to complete the first year's course or to have equivalent qualifications. The cost of each course is $15.00.

MODERN PRACTICE IN VAPOR HEATING

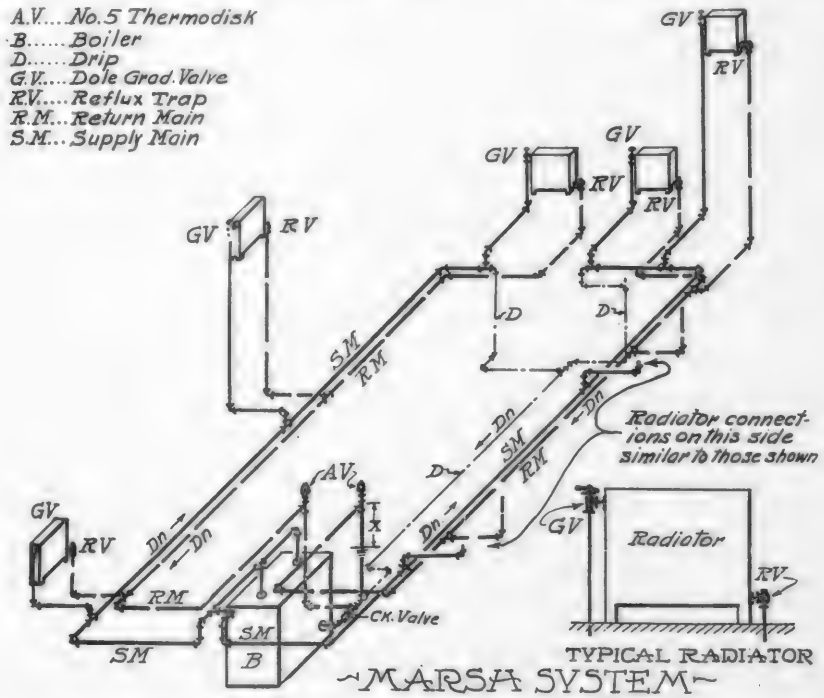
V

The Marsh System.

Editor's Note.—*For the purpose of this series of articles, a vapor, vacuum, vapor-vacuum, vacuum-vapor, atmospheric, modulated or thermograde system of heating will be considered as any system in which the steam pressure ordinarily carried is practically at atmosphere, or slightly below, or in which the returns are open to the atmosphere and where no pump or other positive mechanical device is employed to pull back the returns.*

The Marsh system of vapor heating is similar to the typical vapor system illustrated in the first article of this series except in the fact that the return is not opened to the atmosphere direct; instead, the air is relieved through a special vent valve which will be described hereafter.

This system employs the usual hot-water type of radiators and the piping is run in the general style indicated in the typical layout shown in Fig. 1. In this view the steam is generated in any common boiler and passes



TYPICAL LAYOUT OF MARSH SYSTEM.

up through the steam mains and supply risers to the radiator control valves which consist of the Dole packless ball-bearing valve, illustrated in Fig. 2, these valves being made in sizes running from ½-in. to 2-in. The valves are adjusted in the factory to suit the various sizes of radiators to which they are applied, while if any resetting is required after installation a simple loosening of the octagon nut on the top of the valve so as to allow the turning of the dial is all that is necessary.

After passing through the radiator the air and condensed steam leave through the return connection passing through the Reflux Junior thermostatic trap. The interior construction of this trap is illustrated in Fig. 3 and it comes in standard pipe sizes from ½-in. to 1-in. inclusive. In shape these valves may be obtained in angle, offset globe, right-hand corner and left-hand corner patterns. They consist of only one movable part, viz., a phosphor-bronze thermostatic diaphragm filled with a special mixture of volatile fluids. These traps are designed to give satisfactory operation up to as high as 15 lbs.

differential which is, of course, much higher than anything obtained with a vapor system. Owing to the use of the traps which prevent steam and vapor getting into the return lines it is unnecessary to increase the radiator surface over that actually required.

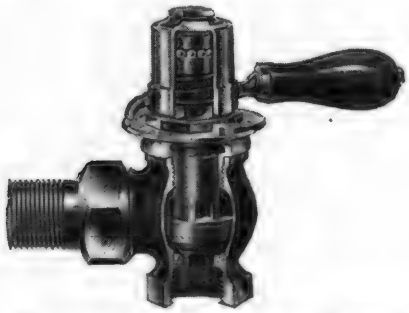


FIG. 2.—DOLE PACKLESS BALL-BEARING VALVE USED WITH MARSH SYSTEM.

The air and condensation then follow down the return line to a point near the boiler where the return line is vented by a No. 5 Thermodisk rapid vent valve, a sectional cut of which is shown in Fig. 4.

This vent valve consists of a valve supported on an expansion disc so as to close when the steam strikes it by the expanding of the disc. An inverted bell-shaped shield acts as float to close the valve when it is filled with water and this prevents blowing out of water through the valve itself. The air is allowed to discharge into the basement and the return sinks down and enters the boiler through a check valve.

The boiler is controlled by means of a sensitive draft regulator and the height of the return line above the boiler water-line is governed by the pressure the system is designed to carry. Thus, if the distance from the boiler water-line to the return main is 28-in. the maximum boiler pressure would be the pressure equal to water head of 28-in. less 8-in. to open the check valve or

$$\frac{28\text{-in.} - 8\text{-in}}{12} \times 0.43 \text{ or}$$

$$\frac{20}{12} \times 0.43 \text{ or}$$

$1.66 \times 0.43 = 0.713$ lbs. or about ¾ lb.

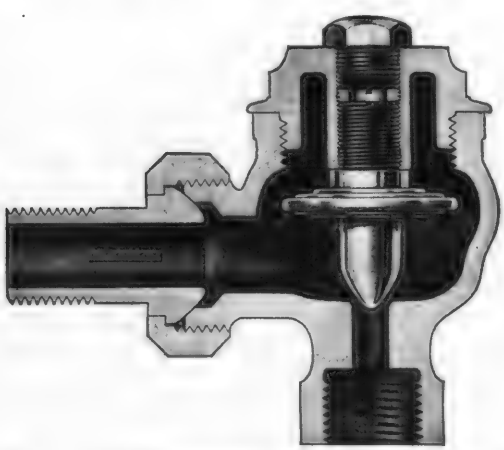


FIG. 3.—CONSTRUCTION OF MARSH REFLUX JUNIOR THERMOSTATIC TRAP.

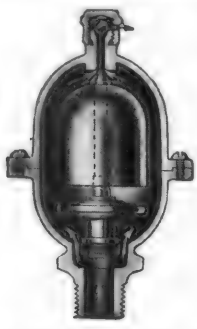


FIG. 4—THERMODISK RAPID VENT VALVE FOR VENTING THE RETURN LINE.

A less difference would decrease the allowable boiler pressure and a greater difference would increase it. The boiler regulator, of course, must be set to maintain a pressure not in excess of that allowable from this varying height in each individual case.

This system is marketed by Jas. P. Marsh & Co., Chicago, Ill.

New Publications.

DIRECTORY OF THE AMERICAN ASSOCIATION OF ENGINEERS, giving a brief synopsis of the experience and training of all members of the association, has been published by the American Association of Engineers, 29 South La Salle St., Chicago, Ill. Classified tables have been compiled based on experience, so that it is possible to find a consulting engineer, an executive or a subordinate having specific experience and living in any definite locality. 2204 members are registered in the directory. Cloth, 6 x 9 in. Pp. 192. Price, $2.00.

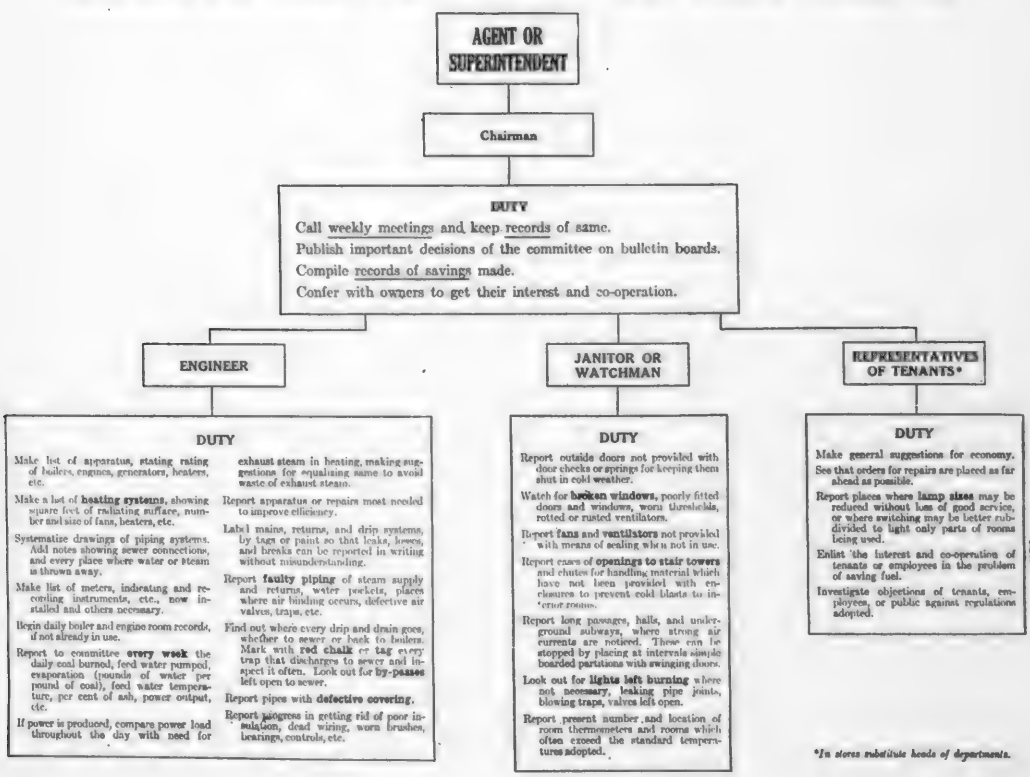
RULE RELATING TO SPRINKLER SYSTEMS (not applicable to the City of New York) has been issued in bulletin form (Bulletin No. 20 of the Industrial Code) by the State Industrial Commission, of the New York Department of Labor. The rule was adopted by the commission July 1, 1918. It covers various types of automatic sprinkler

systems, including automatic wet-pipe systems, in which the pipes and sprinkler heads are at all times filled with water; automatic dry-pipe systems, in which the pipes and sprinkler heads are filled with compressed air and the water supply is controlled by a dry-pipe valve; and non-automatic systems in which all pipes and sprinkler heads are maintained dry, with a fire department connection for water supply.

FUEL SAVING IN OFFICE BUILDINGS AND STORES, being Bulletin No. 2 of the Advisory Engineering Committee of the Massachusetts Fuel Administrator, is the title of what has been described as one of the best set of suggestions and rules that have been compiled on this subjejct. The chairman of this committee is Ira N. Hollis. The bulletin starts out by saying that there will be a probable shortage of at least 6,000,000 tons of steam coal in New England. In previous years, states the bulletin, attention has been directed to the boiler and engine room equipment as the chief source of loss, but waste is not confined to these departments. The loss or misuse of heat within a building is just as fatal as the waste of coal in producing the steam.

One of the committee's principal suggestions is the formation of a fuel and power committee in each building, composed of the superintendent of the building, the engineer, head janitor or watchman, and several tenants' representatives. In stores substitute heads of departments. In buildings where the steam plant is used for heating only, a smaller committee will be sufficient. Under "methods for Saving Coal" detailed suggestions are given, applying to the boiler room, engine room, heating system, lighting system, and elevator and other power service, respectively. Special emphasis is laid on the importance of temperature regulation and the advice is given to install thermometers freely. If exhaust steam is used for heating, the advice is to regulate its use just as carefully in mild weather when there is a surplus as when live steam has to be added. In large buildings, says the bulletin, it will pay to have a special watchman to make constant rounds for inspection of windows and valves, and to see that standard temperatures are not exceeded. The value of the sun as a factor in warming buildings has been recognized by shutting off steam on the sunny side. Install shut-off valve, adds the bulletin, so that unused rooms are not heated, and use direct radiators instead of the indirect or fan system of heating by hot air. If the latter is unavoidable, take air from

ORGANIZATION CHART — BUILDING FUEL AND POWER COMMITTEE


AGENT OR SUPERINTENDENT
Chairman
DUTY
Call weekly meetings and keep records of same.
Publish important decisions of the committee on bulletin boards.
Compile records of savings made.
Confer with owners to get their interest and co-operation.
ENGINEER
DUTY
Make list of apparatus, stating rating of boilers, engines, generators, heaters, etc.
Make a list of heating systems, showing square feet of radiating surface, number and size of fans, heaters, etc.
Systematize drawings of piping systems. Add notes showing sewer connections, and every place where water or steam is thrown away.
Make list of meters, indicating and recording instruments, etc., now installed and others necessary.
Begin daily boiler and engine room records, if not already in use.
Report to committee every week the daily coal burned, feed water pumped, evaporation (pounds of water per pound of coal), feed water temperature, per cent of ash, power output, etc.
If power is produced, compare power load throughout the day with need for exhaust steam in heating, making suggestions for equalising same to avoid waste of exhaust steam.
Report apparatus or repairs most needed to improve efficiency.
Label mains, returns, and drip systems, by tags or paint so that leaks, losses, and breaks can be reported in writing without misunderstanding.
Report faulty piping of steam supply and returns, water pockets, places where air binding occurs, defective air valves, traps, etc.
Find out where every drip and drain goes, whether to sewer or back to boilers. Mark with red chalk or tag every trap that discharges to sewer and inspect it often. Look out for by-passes left open to sewer.
Report pipes with defective covering.
Report progress in getting rid of poor insulation, dead wiring, worn brushes, bearings, controls, etc.
JANITOR OR WATCHMAN
DUTY
Report outside doors not provided with door checks or springs for keeping them shut in cold weather.
Watch for broken windows, poorly fitted doors and windows, worn thresholds, rotted or rusted ventilators.
Report fans and ventilators not provided with means of sealing when not in use.
Report cases of openings to stair towers and chutes for handling material which have not been provided with enclosures to prevent cold blasts to interior rooms.
Report long passages, halls, and underground subways, where strong air currents are noticed. These can be stopped by placing at intervals simple boarded partitions with swinging doors.
Look out for lights left burning where not necessary, leaking pipe joints, blowing traps, valves left open.
Report present number and location of room thermometers and rooms which often exceed the standard temperatures adopted.
REPRESENTATIVES OF TENANTS*
DUTY
Make general suggestions for economy.
See that orders for repairs are placed as far ahead as possible.
Report places where lamp sizes may be reduced without loss of good service, or where switching may be better subdivided to light only parts of rooms being used.
Enlist the interest and co-operation of tenants or employees in the problem of saving fuel.
Investigate objections of tenants, employees, or public against regulations adopted.
*In stores substitute heads of departments.

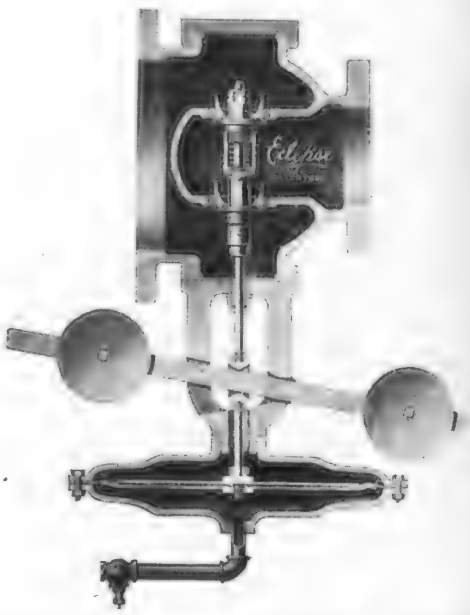
indoors if the design allows. Size 8¼ x 10¾ in. Pp. 8.

METHANE ACCUMULALTIONS FROM INTERRUPTED VENTILATION, with special reference to coal mines in Illinois and Indiana, has been published by the Bureau of Mines as Technical Paper 190. The authors are Howard I. Smith and Robert J. Hamon. The tests shed new light on the much-discussed question of slowing or stopping the mine fan during or previous to shot firing. This has long been the general practice, based on the idea that still air will not propogate an explosion readily. It was also held that when the fan is running, the intake side of the mine, because of the stronger air current there, is the one more susceptible to explosion, and that, in a mine without ventilation the air quickly loses oxygen and gains carbon dioxide, and this change is aided by the products of combustion from the shots fired until the danger of explosions being propagated is greatly reduced. It has been further held that where air is traveling through a mine at high velocity there is a greater quantity of air in the mine at any one time, consequently a greater chance for propogation of explosions, also that in still air inflammable dust disturbed by one blast is not liable to be carried to any place where another blast may ignite it easily. It is in the present tests that some of these reasons are not valid and others hold good in particular cases only. The danger of slowing down the fans, moreover, is found to be exceedingly dangerous, the facts indicating that in districts where this practice is tolerated there have been more explosions than in any other districts in the United States. The authors' conclusion is that if methane is present, even in small percentages, interrupted ventilation in a mine means the certain increase of a known danger for the elimination of a less serious one. Size 6 x 9 in. Pp. 46.

THE TARS DISTILLED FROM BITUMINOUS COAL IN HAND-FIRED FURNACES are discussed in Technical Paper 195, issued by the Bureau of Mines, under the authorship of S. H. Katz. This paper deals especially with the liquid or tar part, at ordinary temperatures, of the volatile matter evolved in a coal fire. The samples of tar examined were taken, in one case, from points within the fuel bed where the coal was burning at low rates, and in other cases, from points on the surface of the fuel bed burning at a moderately rapid rate in a large hot furnace. The following are among the conclusions given: (1) When bituminous coal in quantities to last for a period of hours is added to a slowly-burning fire, tar may be found in the gases within the fuel bed through a considerable part of the time the coal is burning; (2) when coal is added to fires in uniform quantities and at short, regular intervals, the greatest quantity of tar in the gases is at the surface of the bed; (3) at a point 1 ft. above the bed of bituminous coal burning in a large, hot furnace at moderately rapid rates, practically all tar had disappeared. Size 6 x 9 in. Pp. 20.

Trade Literature.

ECILPSE STEAM SPECIALTIES, described as "the standard for over a quarter of a century," are featured in Bulletin No. 101, issued by the Illinois Engineering Co., manufacturing engineers, Chicago, Ill. This is the well-known line that was markcted for many years by the Hughson-John Davis Company, and includes various types of pressure-regulating valves for vacuum, low and high-pressure work, air-regulating valves, automatic water regulators and central station reducing valves. A notable feature of the pressure-regulating valve for low-pressure heating is the arrangement of the piston which is automatically adjustable and self-compensating for variable temperature conditions, so that these valves remain tight under varying pressures. The bulletin describes and illustrates the various type in detail, giving the necessary information for the user. Size 6 x 9 in. (standard). Pp. 24.



CONSTRUCTION OF ECLIPSE VACUUM-HEATING PRESSURE-REGULATING VALVE.

SIROCCO SERVICE for July, 1918, published by the American Blower Co., Detroit, Mich., has an interesting article on the electrification of the Chicago, Milwaukee & St. Paul Railroad. In the electrification plant which includes 14 sub-stations 30 miles apart, sixteen Sirocco blower equipments are installed on the Missoula Division, comprising seven substations. A further extension will use additional Sirocco units. Sirocco blowers are used in this connection for the cooling of the generators. Other articles in this issue describe the equipment of the Hotel Winton, Cleveland, and the building of Uncle Sam's big fleet of merchant ships. A large number of Sirocco ventilating equipments, it is stated, are installed on these ships.

NATURAL VENTILATION FOR FOUNDRIES is the title of a catalogue issued by the Detroit Steel Products Co., Detroit, Mich., devoted to Fenestra steel sash construction. Size 5 x 5½ x 8½ in. Pp. 16.

GENERAL ELECTRIC TYPE HEATING APPLIANCES are the subject of a new catalogue, issued by the Edison Electric Appliance Co., Chicago, showing the remarkable range which this kind of appliance now covers. One of these appliances is an electric air heater designed for use in the home, office, factory, etc. It is made of black enamel steel on a cast-iron nickle-plated base and is fitted with cool handles for carrying. According to the instructions given, 1 to 1½ watts per cubic foot should be allowed for heating rooms in moderate climates, and 2½ to 4 watts in extreme climates. The heaters weigh from 20 to 42 lbs. and are made in ten sizes from 1000 to 5000 watts.

NEW TYPE OF ELECTRIC AIR HEATER.

Death of Professor William Kent.

WILLIAM KENT, author of Kent's Engineer's Handbook, and a former president of The American Society of Heating and Ventilating Engineers, died at Gananoque, Ont., where he was spending the summer, September 18. Professor Kent was 68 years old. His passing removes one more of the "old guard" of the heating profession, for although better known as an expert in the power field, he had taken a deep and long-continued interest in the devolopment of the art of heating and ventilation and had contributed much, in the way of papers and through committee work, towards the advancement of the art.

Some of the most active years in the life of Professor Kent were spent at the L. C. Smith College of Applied Sciences of Syracuse University, where he held the position of dean. In recent years his time was given over largely to lecturing on mechanical subjects in various colleges.

Probably Professor Kent's best title to fame will rest in his "Mechanical Engineers' Pocketbook," which is known and used wherever American engineering enterprises are carried on. This work is now in its ninth edition.

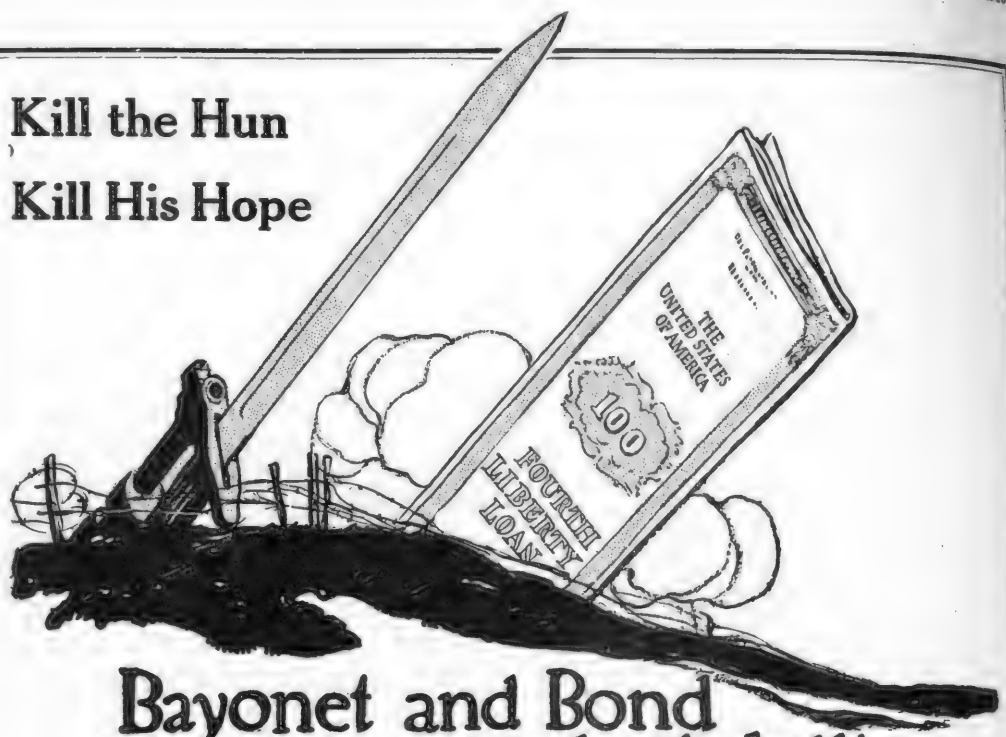
Deaths.

GEORGE W. MACKAY, Montreal, Canada, a brother of William M. Mackay, of New York, and of the late James Mackay, of Chicago, died at his home in Montreal August 16. He was 44 years old. Mr. Mackay went overseas with the first Canadian contingent and was gassed and wounded while fighting in Belgium. His son was killed in the same action. For the past two years he has been in various hospitals in England, France, Scotland and Canada.

PATRICK NACEY, president and founder of the P. Nacey Co., Chicago, heating and plumbing engineers and contractors, died at St. Bernard's Hospital in that city August . He was 76 years old. He is survived by his son, Harry M. Nacey, who will carry on the business.

A modern dehydrating plant has been installed at the War Food Bureau in Baltimore, Md., which is being used to take care of the produce from the war gardens in that State. The plant is of the simple dryer type, without fans, and is intended partly as a demonstration of what can be accomplished on the farm with a simple drying outfit, the principal features being a series of wire trays and a small stove.

Kill the Hun
Kill His Hope



Bayonet and Bond —both kill!

ONE KILLS the Hun, the other kills his hope. And to kill his hope of victory is as essential right now as to kill his fighting hordes. For while hope lasts, the Wolf of Prussia will force his subject soldiers to the fighting line.

We have floated other loans, built a great fleet of ships, sunk pirate submarines, sent our men across and shown the Kaiser's generals what American dash and grit and initiative can do. The Hun has felt the sting of our bullets and the thrust of our bayonets. He is beginning to understand America Aroused—to dread the weight of our arms and energy.

This is a crucial moment. Nothing can so smother the Hun morale, so blast his hopes, as a further message from a hundred million Freemen, a message that says in tones that cannot be misunderstood, "Our lives, our dollars, our ALL —these are in the fight for that Liberty which was made sacred by the sacrifices of our forefathers."

Buy U. S. Government Bonds Fourth Liberty Loan

Contributed through Division of Advertising

United States Govt. Commission on Public Information

This space contributed for the Winning of the War by

The Publisher of

THE HEATING AND VENTILATING MAGAZINE

EQUIVALENT HOT BLAST TEMPERATURES

FOR OTHER TEMPERATURES THAN ZERO

The temperature that a hot blast system under test should maintain when the outside temperature is other than zero may be obtained from the formula

$$T = \frac{t_g\,(t_s - t_o) + t_s\,(t_o - t_{os})}{t_s - t_{os}}$$

when T is the resultant building temperature when the outside temperature is t_o,

t_g the guaranteed building temperature at a specified outside temperature (t_{os}),

t_{os} the outside temperature specified,

t_s the temperature of the steam at the pressure stipulated,

t_o the actual outside temperature.

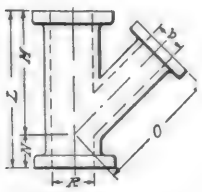
From this formula Table I has been calculated and shows what temperature should be reached for any guarantee with any outside temperature.

TABLE I.

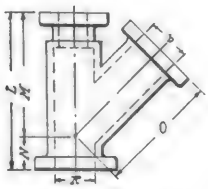
Outside Temp. to Deg. F.	Average Indoor Temperature—T Deg. F.							
—20	45.2	50.8	56.1	61.6	67.1	72.5	77.9	83.4
—15	48.9	54.3	59.7	64.9	70.3	75.6	80.9	87.3
—10	52.9	57.9	63.1	68.3	73.5	78.7	86.0	89.2
— 5	56.3	61.4	66.5	71.6	76.8	81.9	87.0	92.1
0	60.	65.	70.	75.	80.	85.	90.	95.
5	63.7	68.6	73.5	78.4	83.2	88.1	93.0	97.9
10	67.4	72.1	76.9	81.7	86.5	91.3	96.0	100.8
15	71.0	75.7	80.3	85.1	89.7	94.4	99.1	103.7
20	74.7	79.3	83.9	88.4	92.9	97.5	102.1	106.6
25	78.4	82.9	87.3	91.8	96.2	100.7	105.1	109.5
30	82.1	86.4	90.8	94.1	99.4	103.8	108.1	112.4
35	85.8	90.0	94.3	97.5	102.6	106.9	111.2	115.3
40	89.4	93.6	97.7	101.8	105.9	110.0	114.2	118.2
45	93.1	97.1	101.2	105.4	109.1	113.2	117.2	121.1
50	96.8	100.7	104.7	108.5	112.4	116.3	120.2	124.0
55	100.5	104.3	108.1	111.9	115.6	119.4	123.3	126.9
60	104.2	107.8	111.6	115.2	118.8	122.6	126.3	129.8
65	107.8	111.4	115.0	118.6	122.1	125.7	129.3	132.7
70	111.5	115.0	118.5	121.9	125.3	128.8	132.4	135.6

(Buffalo Forge Co.)

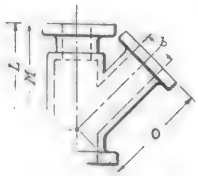
1915 STANDARD WEIGHT FLANGED REDUCING LATERALS.



Reducing Lateral.



Reducing-on-Run Lateral.

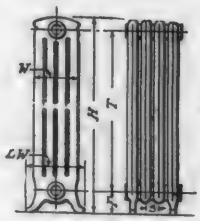


Reducing-on-Run-and Branch Lateral.

Size, In. Diam.		Dimensions, In.				Flanges	
R	Branch b	L	M	N	O	Dia. In.	Thickness In.
1	—	—	—	—	—	4	7/16
1¼	1¼ or less	8	6¼	1¾	6¼	4½	½
1½	1½ " "	9	7	2	7	5	9/16
2	2 " "	10½	8	2½	8	6	5/8
2½	2½ " "	12	9½	2½	9½	7	11/16
3	3 " "	13	10	3	10	7½	¾
3½	3½ " "	14½	11½	3	11½	8½	13/16
4	4 " "	15	12	3	12	9	15/16
4½	4½ " "	15½	12½	3	12½	9¼	15/16
5	5 " "	17	13½	3½	13½	10	15/16
6	6 " "	18	14½	3½	14½	11	1
7	7 " "	20½	16½	4	16½	12½	1 1/16
8	8 " "	22	17½	4½	17½	13½	1⅛
9	9 " "	24	19½	4½	19½	15	1⅛
10	10 " "	25½	20½	5	20½	16	1 3/16
12	12 " "	30	24½	5½	24½	19	1¼
14	14 " "	33	27	6	27	21	1⅜
15	15 " "	34½	28½	6	28½	22¼	1⅜
16	16 " "	36½	30	6½	30	23½	1 7/16
18	9 " "	26	25	1	27½	25	1 9/16
18	18 to 10 inc.	39	32	7	32	25	1 9/16
20	10 and less	28	27	1	29½	27½	1 11/16
20	20 to 12 inc.	43	35	8	35	27½	1 11/16
22	10 and less	29	28½	½	31½	29½	1 13/16
22	22 to 12 inc.	46	37½	8½	37½	29½	1 13/16
24	12 and less	32	31½	½	34½	32	1⅞
24	24 to 14 inc.	49½	40½	9	40½	32	1⅞
26	12 and less	35	35	0	38	34¼	2
26	26 to 14 inc.	53	44	9	44	34¼	2
28	14 and less	37	37	0	40	36½	2 1/16
28	28 to 15 inc.	56	46½	9½	46½	36½	2 1/16
30	15 and less	39	39	0	42	38¾	2⅛
30	30 to 16 inc.	59	49	10	49	38¾	2⅛

UNITED STATES RADIATOR CORPORATION'S 3-COLUMN FLORENTINE RADIATORS FOR STEAM AND WATER.

No. of Sections	*Length Inches	Heating Surface: 45 Inch Height 6 Sq. Feet per Sect'n	38 Inch Height 5 Sq. Feet per Sect'n	32 Inch Height 4½ Square Feet per Section	26 Inch Height 3¾ Square Feet per Section	22 Inch Height 3 Square Feet per Section	18 Inch Height 2¼ Square Feet per Section
2	5	12	10	9	7½	6	4½
3	7½	18	15	13½	11¼	9	6¾
4	10	24	20	18	15	12	9
5	12½	30	25	22½	18¾	15	11¼
6	15	36	30	27	22½	18	13½
7	17½	42	35	31½	26¼	21	15¾
8	20	48	40	36	30	24	18
9	22½	54	45	40½	33¾	27	20¼
10	25	60	50	45	37½	30	22½
11	27½	66	55	49½	41¼	33	24¾
12	30	72	60	54	45	36	27
13	32½	78	65	58½	48¾	39	29¼
14	35	84	70	63	52½	42	31½
15	37½	90	75	67½	56¼	45	33¾
16	40	96	80	72	60	48	36
17	42½	102	85	76½	63¾	51	38¼
18	45	108	90	81	67½	54	40½
19	47½	114	95	85½	71¼	57	42¾
20	50	120	100	90	75	60	45
21	52½	126	105	94½	78¾	63	47¼
22	55	132	110	99	82½	66	49½
23	57½	138	115	103½	86¼	69	51¾
24	60	144	120	108	90	72	54
25	62½	150	125	112½	93¾	75	56¼



Note—Add 1/2 in for each bushing to get total lenght of radiator.
H = Total over all height.
T = C. to C. of tappings
F = Floor to center of bottom tapping.
W = Width of radiator—9 in.
LW = Width of radiator legs—9 5/16 in.
S — Width of radiator sections, i. e., to of sections—2 1/2 in.

Nominal Height of Radiator In.	Actual Height H In.	Steam Supply and Return F In.	Steam Supply and Return T In.	Water Supply and Return F In.	Water Supply and Return T In.
45	45	4	38 3/8	4 1/2	37 7/8
38	38	4	31 9/16	4 1/2	31 1/16
32	32	4	25 9/16	4 1/2	25 1/16
26	26	4	19 5/8	4 1/2	19 1/8
22	22	4	15 5/8	4 1/2	15 1/8
18	18	4	11 3/4	4 1/2	11 1/4

For high legs F. equals 6 in. and H. is increased 2 in. for steam of 1 1/2 in. for water.
For legless radiators deduct 2 1/2 in. from F. and H.

TAPPING DATA

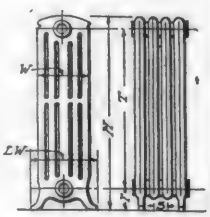
All radiators are tapped 2 in. and bushed as follows:

SYSTEM	Size of Radiator Square Feet	Supply In. Diam.	Return In. Diam.
Steam, one-pipe	Up to 24 sq. ft. in.	1	
	Over 24 up to 60 inc.	1 1/4	
	Over 60 up to 100 inc.	1 1/2	
	Above 100 sq. ft.	2	
Steam, two-pipe	Up to 48 sq. ft. inc.	1	3/4
	Over 48 up to 96 inc.	1 1/4	1
	Above 96 sq. ft.	1 1/2	1 1/4
Water	Up to 40 sq. ft. inc.	1	1
	Over 40 up to 72 inc.	1 1/4	1 1/4
	Above 72 sq. ft.	1 1/2	1 1/2

All air valve tappings are 1/8 in.
Vapor tappings as instructed only.
All tappings with R. H. threads unless otherwise ordered.

UNITED STATES RADIATOR CORPORATION'S 4-COLUMN FLORENTINE RADIATORS FOR STEAM AND WATER.

No. of Sections	*Length Inches	Heating Surface: 44 Inch Height 10 Sq. Feet per Sect'n	38 Inch Height 8¼ Square Feet per Section	32 Inch Height 7 Sq. Feet per Sect'n	26 Inch Height 5½ Square Feet per Section	22 Inch Height 4½ Square Feet per Section	18 Inch Height 3¼ Square Feet per Section
2	6	20	17	14	11	9	7
3	9	30	25½	21	16½	13½	10½
4	12	40	34	28	22	18	14
5	15	50	42½	35	27½	22½	17½
6	18	60	51	42	33	27	21
7	21	70	59½	49	38½	31½	24½
8	24	80	68	56	44	36	28
9	27	90	76½	63	49½	40½	31½
10	30	100	85	70	55	45	35
11	33	110	93½	77	60½	49½	38½
12	36	120	102	84	66	54	42
13	39	130	110½	91	71½	58½	45½
14	42	140	119	98	77	63	49
15	45	150	127½	105	82½	67½	52½
16	48	160	136	112	88	72	56
17	51	170	144½	119	93½	76½	59½
18	54	180	153	126	99	81	63
19	57	190	161½	133	104½	85½	66½
20	60	200	170	140	110	90	70
21	63	210	178½	147	115½	94½	73½
22	66	220	187	154	121	99	77
23	69	230	195½	161	126½	103½	80½
24	72	240	204	168	132	108	84
25	75	250	212½	175	137½	112½	87½



Note—Add 1/2 in. for each bushing to get total length of radiator.
H = Total over all height.
T = C. to C. of tappings.
F = Floor to center of bottom tapping.
W = Width of radiator—12 1/2 in.
LW = Width of radiator legs—12 13/16 in.
S = Width of radiator sections, i. e., to of sections—3 in.

Nominal Height of Radiator In.	Actual Height H. In.	Both Steam and Water Supply and Return F In.	T In.
44	44	4 1/2	36 15/16
38	38	4 1/2	31 1/16
32	32	4 1/2	25 1/16
26	26	4 1/2	19 1/8
22	22	4 1/2	15 1/8
18	18	4 1/2	11 1/4

For high legs F. equals 6 in. and H. is increased 1 1/2 in.
For legless radiators deduct 2 1/2 in. from F and H.

TAPPING DATA

All radiators are tapped 2 in. and bushed as follows:

SYSTEM	Size of Radiator Square Feet	Supply F In. Diam	Return F In. Diam.
Steam, one-pipe	Up to 24 sq. ft. inc.	1	
	Over 24 up to 60 inc.	1 1/4	
	Over 60 up to 100 inc.	1 1/2	
	Above 100 sq. ft.	2	
Steam, two-pipe	Up to 48 sq. ft., inc.	1	3/4
	Over 48 up to 96 inc.	1 1/4	1
	Above 96 sq. ft.	1 1/2	1 1/4
Water	Up to 40 sq. ft., inc.	1	1
	Over 40 up to 72 inc.	1 1/4	1 1/4
	Above 72 sq. ft.	1 1/2	1 1/2

All air valve tappings are 1/8 in.
Vapor tappings as instructed only.
All tappings with R. H. Threads unless otherwise ordered.

TRADE AND MISCELLANEOUS NOTES

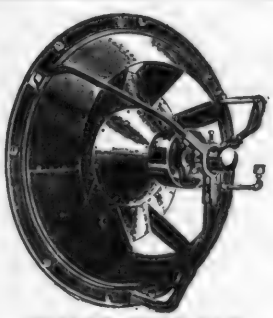
Miscellaneous Notes.

Albany, N. Y.—An amendment recently passed to the forest preserve law provides that "the foregoing provisions of this section shall not prevent the legislature from authorizing the cutting and removal of dead and fallen timber on lands in the forest preserve for fuel or other domestic purposes."

Peoria, Ill.—A remarkable exhibition of patriotism was shown at the recent convention of the Illinois State Boiler Makers' Association when a message was read at one of the sessions from Director General of Railroads McAdoo requesting that all delegates whose work was connected with railways make their stay away from their places as brief as possible, owing to the pressing work on hand. More than half of the delegates left their seats in the convention and made for the station to take the first train back to their work.

Evanston, Ill.—Evanston members of the Chicago Master Steam Fitters' Association are taking a prominent part in the work of the U. S. Employment Service in that section. The keynote of the campaign is an appeal to workmen to continue with their present positions and not change until necessary and then only with the advice and direction of the United States Employment Service. The problem of burning soft coal in steam and hot water heaters is also being taken up by this organization and plans are being made to advise the public how to obtain the best results in burning soft coal and how to avoid the choking of the heaters with soot and tar.

Twenty Causes for unsatisfactory results in hot water or steam heating are given in



DUPLEX CONE FAN
Belt Driven

HOWARD & MORSE
45 FULTON ST., N. Y.
Ventilating Engineers and Contractors
MANUFACTURERS OF
BLACKMAN and DUPLEX CONE FANS

which are installed by us complete with **Motors, Duct Work** and **Wiring.**

Aligning, Rigging and **Hoisting** done, with labor thoroughly qualified from long experience.

We make a specialty of **Kitchen Exhaust** work. Prominent buildings, hospitals, theatres, and private residences are among our many and recent installations.

The **Duplex Cone** Fans are semi-conoidal fans, made especially to operate against pressure in duct systems.

The **Blackman** Fans are used for fresh air delivery and in duct systems, when no great pressure is involved.

You can have the advantage of our experience.

SEND FOR CATALOGUE

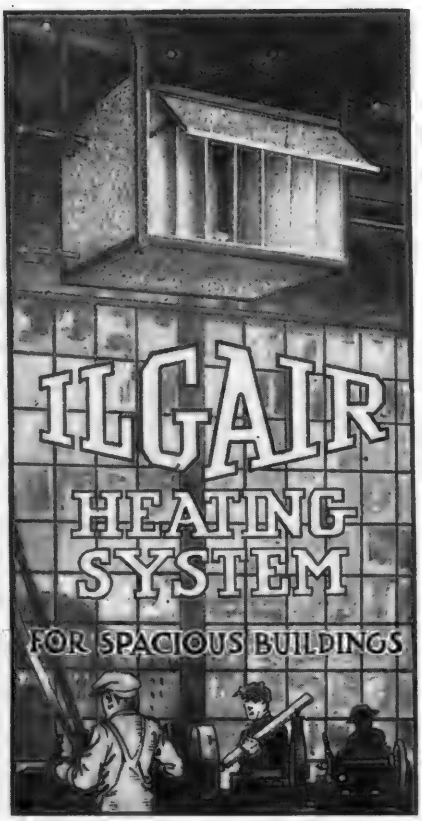
BLACKMAN FAN
Direct Connected to Motor

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

the following order by a Grand Rapids (Mich.) firm of heating contractors:

Insufficient quantity of radiating surface.
Improper location of radiating surface.
Improper position of main pipes.
Insufficient height of column to produce circulation.
Insufficient rise in main pipes.
Obstructions in pipes caused by air or dirt.
Dip in the pipes, causing air pockets.
Air valves improperly fixed on radiators.
Insufficient size of heater.
Improper location of heater.
Deposit of soot and clinkers in heater.
Defective construction of chimney.
Improper firing.
Imperfect draught to chimney.
Deposit of soot in chimney.
Improper size and quality of coal.
Faulty ventilation.
Adjustable ventilators neglected.
Expansion tank improperly connected.
Neglect to clean heater.

Springfield, Ill.—Upon the request of the United States Fuel Administration, announcement has been made by the Springfield Consolidated Railway Company that heat in surface cars will be curtailed considerably during the coming winter. The heaters in the larger cars will be cut from sixteen to eight, while the smaller cars will use from four to six heaters.



ILGAIR
UNIT HEATERS

Offer a new method of heating big spaces

The installation is simple
First cost is low
Installation can be made very quickly
Power consumption very low
System has great flexibility
As good for cooling in summer as for heating in winter

Ideal for heating new war plants with rush orders

Very quick shipments for direct or indirect government work

Write for descriptive bulletin

ILG ELECTRIC VENTILATING CO.
158 WHITING ST., CHICAGO, ILL.
Branches—All Large Cities

HIGH EFFICIENCY TRADE ILG MARK VENTILATING MACHINERY

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DETROIT PACKLESS RADIATOR VALVES

The Correct Radiator Valve for Vapor Heating

The Detroit Packless Vacu Valve is a Graduated Valve for Vapor and Vacuum Systems of Heating. The dial plate is provided with a series of holes and a movable pin. This pin acts as a stop for the handle pointer and is inserted in the hole in the dial nearest the point at which the valve, when opened, admits only sufficient vapor or steam to fully supply the radiator.

DETROIT PACKLESS
Vacu Valve showing Dial Plate and Lever Handle

Booklet VP-1 Gladly Sent Upon Request

DETROIT LUBRICATOR COMPANY
DETROIT, U. S. A.
CANADIAN DETROIT LUBRICATOR COMPANY, LTD. WALKERVILLE, ONTARIO

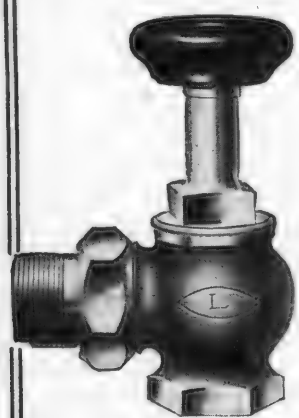
LARGEST MANUFACTURERS OF RADIATOR VALVES IN THE WORLD

American Society of Mechanical Engineers will hold its annual meeting in New York, December 3-6, 1918. Professor Mortimer E. Cooley, of the University of Michigan, has been nominated for president of the society for 1919. F. R. Low, editor *Power,* New York; Henry B. Sargent, New Haven, Conn., and John A. Stevens, consulting engineer, Lowell, Mass., have been nominated for vice-presidents. Charles L. Newcomb, general manager Deane works, Worthington Pump & Machinery Corporation, Holyoke, Mass.; F. O. Wells, president Greenfield Tap & Die Corporation, Greenfield, Mass., and Prof. C. R. Richards, University of Illinois, Urbana, Ill., have been nominated for managers. William H. Wiley, of Wiley & Sons, New York, has been nominated for treasurer.

Eastern Supply Association held its annual meeting at the Hotel Astor, New York, October 9.

National Federation of Building Industries is already actively at work, through its executive committee, in securing rulings and other information to pass on to the trade, from the Capital Issues Committee, director-General of Railroads, Fuel Administrator, Priorities Board, Conservation and Resources Division of the War Industries Board and the Labor Department. The executive committee met in Washington August 21 and the following day had a conference with Mr. Baruch. The federation is organized to maintain the building industry at its highest efficiency compatible with war needs by authorizing the preparation of a plan to be submitted to the government, such plan to provide the authorities with a source of reliable information and to suggest to them a basis upon which proposed building and construction activities of all kinds in each separate territory from time to time may be judged and dealt with intelligently and in the national interest.

Building Operations for August, 1918, show the smallest decrease recorded since April, 1917, although last year the figures for August were 33% below those for the corresponding month in 1916. it is to be noted that the figures, as compiled for 124 cities by the *American Contractor,* Chicago, include the housing operations and other construction work in connection with military operations, but not the cantonments or other structures undertaken directly by the government. The August figures total $40,854,125, as compared with $45,484,596 for August, 1917, a decrease



Good Luck Is a Matter of GOOD JUDGMENT...

Selecting the right kind of a Steam Radiator Valve is a matter of good judgment and may mean the difference between a perfect job of steam fitting and a defective system.

The Lavigne

Packless Quick-Opening Steam Radiator Valve

means dependable service and inspires confidence in your customers and makes every contract safe, sound and satisfactory. It safeguards your dealings and guarantees complete satisfaction. It holds the good will of your customers. ***Built Right to Stay Tight.***

ASK YOUR JOBBER

Commonwealth Brass Corporation, -- Detroit, Michigan

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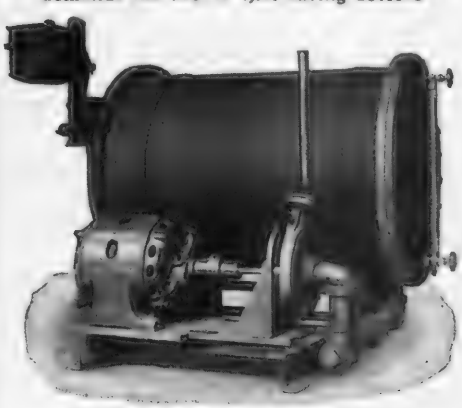
of 10%. Among the cities showing gains are Camden, N. J., with a total of $2,743,634 a gain of 2123%, due to housing construction; Chicago, $4,635,900, a gain of 13%; Dallas, $248,730, a gain of 71%; Davenport, $209,178, a gain of 105%; Dayton, $419,758, a gain of 220%; Des Moines, $874,529, a gain of 688%; Erie, Pa., $348,954, a gain of 31%; Fort Worth, $206,480, a gain of 476%; Grand Rapids, $192,535, a gain of 36%; Indianapolis, $931,394, a gain of 11%; Long Beach, $243,599, a gain of 120%; Louisville, $139,360, a gain of 114%; Norfolk, $256,975, a gain of 465%; Oakland, Cal., $901,477, a gain of 132%; Philadelphia, $1,931,390, a gain of 24%; San Diego, $524,018, a gain of 350%; Seattle, $1,099,015, a gain of 136%; Superior, Wis., $336,415, a gain of 198%; Tacoma, $285,530, a gain of 615% Wichita, Kan., $194,120, a gain of 140%; Wilkes-Barre, $217,298, a gain of 171%; and Wilmington, $892,554, a gain of 171%. The principal cities reporting losses were Akron, 65%; Atlanta, 75%; Boston, 42%; Cincinnati, 65%; Cleveland, 49%; El Paso, 89%; Milwaukee, 54%; Newark, 38%; New Bedford, 83%; New Haven, 68%; San Francisco, 28%; and Youngstown, 34%. New York's figures were within 3% of those for last August, being $5,095,595.

WAR-TIME ECONOMY

demands the use of fuel-saving devices



ARCHITECTS AND ENGINEERS designing new plants generally provide for economical equipment, but there are many existing low pressure steam heating plants where a surprising amount of fuel could be saved by the installation of

Yeomans Electrically Operated Condensation Return Pumps

Made in Horizontal and Vertical Types for automatic operation

Send for Bulletin C-5000. Agents in all principal cities.

YEOMANS BROTHERS CO.
223 Institute Pl. Chicago, Ills.

Your Next Heating Estimate

In making up your next heating bid, enter this item—"Johns-Manville Radiator Traps"—and in your cost column, right opposite, enter "Lower Cost"—then add this note—"*No expense after installation.*"

Before this better and most simple Radiator Trap was made, *finishing-up* details took too long. That meant real money loss. Profit dwindled as troubles increased. But now—with this three-piece trap—only a body, cap and hollow ball, when you finish a job—you're done. Because it cannot leak, or bind, on either air or steam. And it is fool-proof and armor-plated against meddling fingers. Self-adjustable, it is mechanically perfect in design as well as in action.

There are two profits coming to you—one on the selling price and one on installation. Our nearest branch will mail you a copy of our Steam Trap bulletin if you request it.

JOHNS-MANVILLE SERVICE COVERS THE CONTINENT

H. W. JOHNS-MANVILLE CO.
New York City
10 Factories—Branches in 63 Large Cities

Johns-Manville Radiator Trap

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

New York.—Carrère & Hastings, New York architects, have prepared plans for the construction of a convention hall in Baltimore, to cost $800,000.

Heating and Piping Contractors' National Association is now the official name of the National Association of Master Steam and Hot Water Fitters, the officers having taken the final legal steps in effecting the change. The association's headquarters will remain at 50 Union Square, New York.

Manufacturers' Notes.

Pratt & Cady Co., Hartford, Conn., has purchased the entire plant and business of I. B. Davis & Sons, of Hartford, manufacturers of feed-water heaters and hot-water heaters. The company will continue the manufacture of the Davis products.

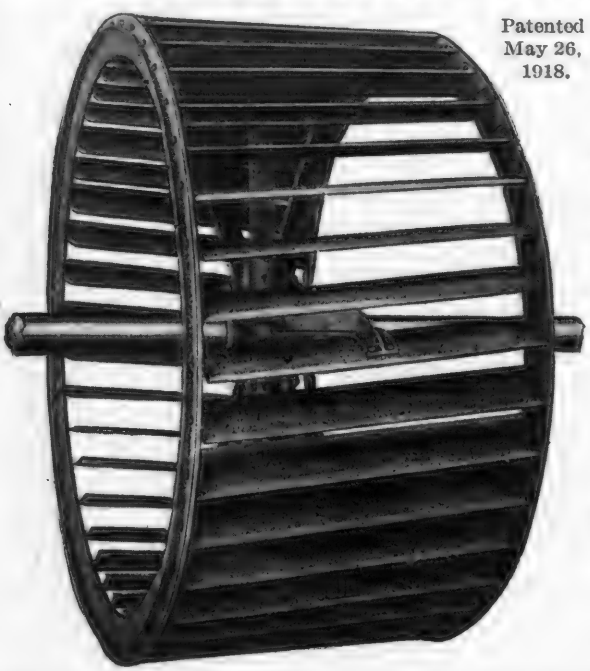
United States Radiator Corporation, Detroit, Mich., earned $645,813 in the year ended January 31 last, and thereby changed the deficit that its balance sheet had shown for some years into a surplus of $478,933. No dividends have been reported on the $2,800,000 of preferred stock since July, 1911. The company has a serial bond issue which has been reduced from $1,000,000 to $720,000 and a floating debt of $1,089,000.—From *Tribune (Chicago) Investor's Guide.*

Bayley Mfg. Co., Milwaukee, Wis., has prepared plans for a foundry to be 63 x 110 ft., of brick and reinforced concrete for making gray iron castings. The estimated cost of the building is $25,000. Construction work, however, has been deferred for the present, as the company has been able to maintain its satisfactory arrangements for the supply of castings from existing shops.

Warren Webster & Co., Camden, N. J., has appointed J. F. Tuttle as manager of the company's New England branch. His headquarters will be in the Penn Mutual Building, Boston. Mr. Tuttle was previously assistant manager of the Chicago office of Warren Webster & Co.

C. A. Dunham Co., Chicago, Ill., has appointed Joseph F. Brightman as manager of its Rochester (N. Y.) branch. Mr. Brightman formerly held this position with the C. A. Dunham Company. In 1913 he associated himself with the Syracuse Faucet & Valve Company, which was recently taken over by the Pierce, Butler & Pierce Mfg. Corporation.

THE NEW IMPROVED **Cycloidal Multivane Wheel**



Patented May 26, 1918.

For Heating and Ventilating

The vanes are curved forward, and set at an angle to the shaft, (patented feature) allowing uniform, unrestricted flow of air across entire width of wheel.

Highest Efficiency

Noiseless and Durable

Write for further details

Garden City Fan Co.
Est. 1879
CHICAGO, ILL.
Eastern Representatives:
L. J. WING MFG. CO., New York

Sirocco"
TRADE MARK

Speeds Up Production

In these days of rush work, with everything strained to the limit, fresh pure air for the factory is of vital importance.

The Sirocco System of Heating and Ventilating is used by many of America's best known and most successful manufacturers.

The view above shows an installation in a factory noted for its production and efficiency methods.

In the "dog days" of summer the Sirocco System is invaluable in keeping the factory workers fresh and fit by supplying the proper amount of fresh, pure air to every nook and corner.

Let us tell you more about Sirocco for your factory—Ask for Bulletin No. 270.

American Blower Company

DETROIT, MICHIGAN

BRANCHES IN ALL PRINCIPAL CITIES

Chicago Pump Co., Chicago, Ill., has doubled its former floor space to take care of its enlarged business, much of which is on Government contract.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., reports that the demands for marine propelling equipments for the Emergency Fleet Corporation have become so imperative that the company's new Essington plant, at South Philadelphia, has recently been placed in operation for the exclusive production of this equipment. This equipment embraces everything between the boiler plant and the propeller of the vessel.

Central Station Heating Notes.

Peoria, Ill.—The change from flat to meter rates by the Illinois Central Light Company, which was made in accordance with a recent order of the State Public Utilities Commission, will affect 100 buildings in Peoria and Pekin, where the new system also applies. There are in the two cities 300 buildings heated by steam but 200 of these were already on a meter basis. The ruling went into effect September 1.

Springfield, Ill.—At a hearing in connection with the application of the Springfield Gas and Electric Company for increases in its hot water and steam heat rates, the following rates were proposed by Carroll G. Bennett, water and heat engineer for the State Public Utilities Commission:

Steam—A fixed charge of $8.75 gross a year a square foot of required radiation plus plus 45c. for 1,000 lbs. of condensation.

Hot Water—Twenty-two cents gross a year a square foot of required radiation plus a charge for tank, varying from $8.25 to $46.50 a year, according to its size.

Prompt payment discount, 10% when paid by tenth of month.

Former rates for hot water heating were 15 cents net a square foot of radiation. Steam heat rates heretofore have been largely charged on a flat basis, but all flat rates recently were abolished by a preliminary order of the commission ordering meters installed.

Mr. Bennett placed an original cost valuation on the company's steam heat properties of $363,454 and of $253,317 on its hot water heating properties.

To pay operating expenses, taxes, depreciation and provide a return on monies invested, the foregoing rates were necessary, he testified.

Only one question was asked the witness on cross-examination by P. B. Warren, at-

AUTOVENT Motor Driven Propeller Fans

AUTOVENT fan motors are ventilated through a mechanical process of radial heat convection created by the operation of the fan wheel together with the motor in which the motor temperature is carried away with the general exhaust of the fan wheel. This feature affords the motor to operate under ventilated conditions yet protecting same against foreign substances entering therein.

AUTOVENT fans are specially designed and particularly adaptable to handling steam, moisture, and acid fumes, because the motors are of the protective autovent type.

AUTOVENT fan motors reach the highest point in motor efficiency.

AUTOVENT fans have and will always make good for you because they are built on merit.

PROTECTED TYPE MOTOR

Manufactured by

BATTERMAN TRUITT CO.

736-38 W. Monroe Street

CHICAGO, ILL.

Cleveland Office:
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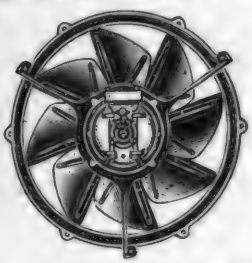
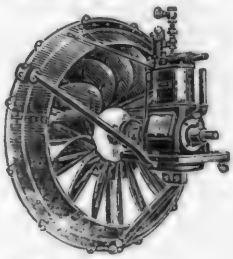
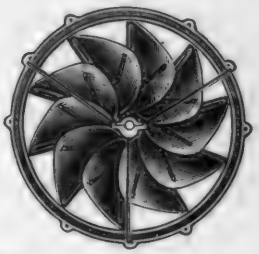
JAMES M. SEYMOUR

NEWARK - NEW JERSEY - U. S. A.

ELECTRIC DRIVEN STEAM DRIVEN BELT DRIVEN

Send for Bulletin No. 121, Jan. 1917

SEYMOUR FANS are the most durable and efficient air moving machines to be had in this country. Built in seven styles and fifteen sizes, 18-inch to 168-inch fans in stock. Capacity 1000 cubic feet to 150,000 cubic feet per minute.

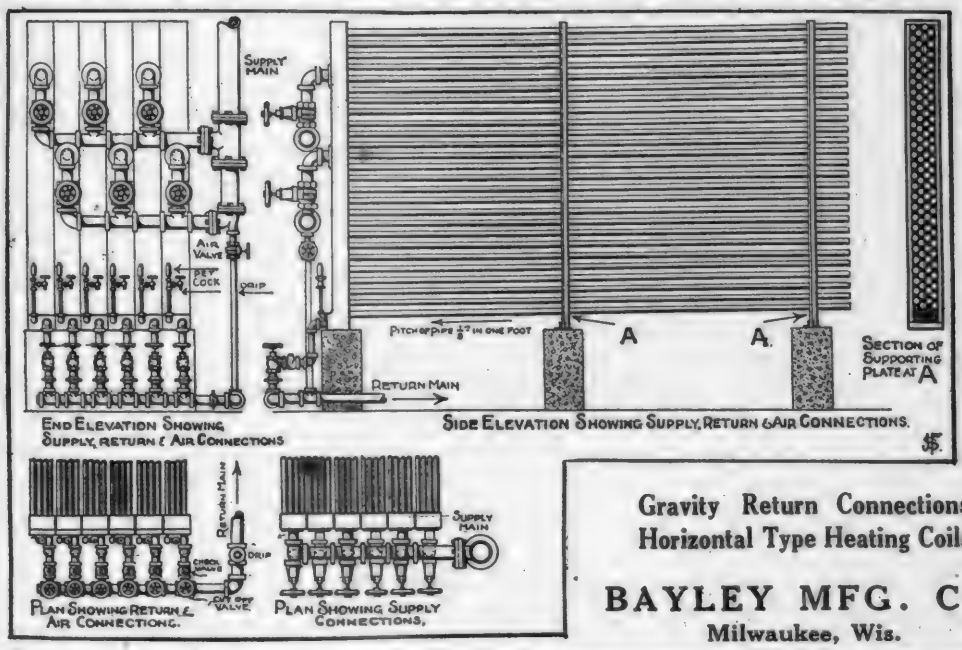
Ventilating systems to suit all conditions. **Dust Collectors, Humidifiers, Dry-Rooms** to dry anything from bricks to sponges.

AIR CONDITIONING

JAMES M. SEYMOUR, 5-7-9-11-15-17-19 Kirk Place, NEWARK, N. J.

CHINOOK HEATERS

Give Positive Circulation No Unequal Expansion and Contraction. Highly Efficient



Gravity Return Connections
Horizontal Type Heating Coils

BAYLEY MFG. CO.
Milwaukee, Wis.

torney for the company, and that was as to whether his estimate of necessary rates was on the assumption that these rates would apply to all consumers without reference to any contracts that may exist.

This elicited the statement from Commissioner Shaw that, without exception, the commission had always refused to recognize any special rate set by contract.

New Incorporations.

Vapor Heat Attachment Mfg. Co., New York, capital $100,000, to manufacture heating attachment. Incorporators: S. D. Johnson, M. Van Blarcom and M. H. Marks, 518 West 135th Street, New York.

Draft Regulator Co., Providence, R. I., capital $25,000. Incorporators: Whiting Metcalf, George F. McCanna and George J. Sheehan, of Cranston, R. I.

New Firms.

E. F. Glore and Jack Major, have opened offices as manufacturers' agents in the Architects' Building, 101 Park Avenue, New York. The firm will do business under the name of Evins F. Glore and will represent the Detroit Lubricating Company, of Detroit, and the Beckwith Co., of Dowagiac, Mich. Mr. Glore is a well-known figure in the heating trade, having been, for the past few years, manager of sales for the Pierce, Butler & Pierce Mfg. Corporation. Mr. Major is also well known to the trade through his connection with the sales force of the Richmond Radiator Company.

Uncle Sam to Train Employment Managers.

The Government has found it necessary to enter the field of education on a large scale. War emergency courses in employment management, conducted by the Employment Management Division of the War Industries Board, under the auspices of five Governmental departments, have been arranged for in nine universities to date. The outline of the courses of study was made by Captain Boyd Fisher, who has general supervision of the work.

These courses on employment management are designed to train men or women, who already have a basic experience of at least three years in industrial life and factory methods, and who have come in actual contact with shop problems. Employers of labor, particularly those having war contracts, are urged to suggest men or women

PRESSWELD RADIATORS

One-fourth the weight of cast-iron
Made of copper bearing sheets
Non-breakable Quick heating
More efficient
Occupy one-third less space
Smooth and sanitary

One piece from end to end

No mechanical joints

Our catalogue goes into details of construction, etc.

Equally adaptable for steam, hot water or vapor systems; gas and electric radiators; various types of refrigeration outfits; and as transformer and engine coolers.

THE AMERICAN PRESSWELD RADIATOR CORP., Detroit, Mich.

Please mention THE HEATING AND VENTILATING MAGAZINE *when you write.*

Specify Buffalo

ONE of the important items of every building about to be constructed is the heating system.

Obviously to give the client the most for his money is the first consideration.

It is comparatively simple to install a heating system but it is another matter to make it always efficient.

Buffalo Fan Systems are no higher in first cost and their upkeep is offset by the saving in heat, the increase in efficiency of the workers.

Putting heat mechanically just where it is wanted by keeping it in circulation instead of letting it escape through the ventilation in the roof, is the cheapest and best way.

Catalog No. 198 gives valuable engineering data on heating and ventilating problems. Our engineering department is always available for consultation.

Write Dept. 36.

BUFFALO FORGE COMPANY
Buffalo, N. Y.

from their own organizations as candidates for these courses. With the increasing tightening of the labor situation, it is absolutely essential that large plants have an efficient central employment department.

Courses have been arranged for at Harvard, in cooperation with the Massachusetts Institute of Technology, Boston University, in Boston; Columbia University, New York; University of Rochester, Rochester, N. Y.; Carnegie Institute of Technology, and the University of Pittsburgh, Pittsburgh, Pa.; University of Washington, Seattle; and the University of California at Berkeley.

Government Control of Power Plants.

A bill that would give the President authority to take over all the power plants of the United States, whether steam, electrical or hydraulic, and to control them for the duration of the war, was introduced in the House on August 19 by Representative Sims of Tennessee. The bill has the indorsement of the President and the Secretary of War, as well as of the heads of the various boards having direction of war activities and conservation. It carries an initial appropriation of $200,000,000, a large part of whch would be spent in the purchase and building of power plants at the mouths of coal mines. In this way much of the low-grade fuel that cannot be shipped to market would be made available for the generation of electric power, which would be distributed by transmission lines to factories and plants engaged in doing war work.

Work of U. S. Employment Service.

In a statement issued by the U. S. Employment Service, through A. H. Krom, director of engineering, emphasis is laid on the fact that at present the demand for executives in the war industries is principally for

Braemer

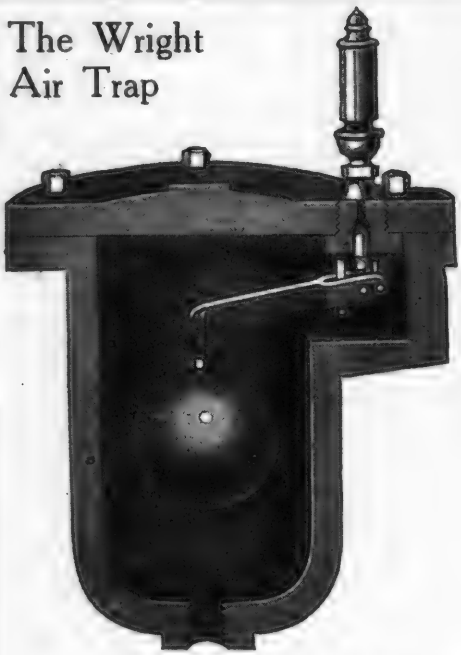
Air Conditioning Corporation

Air Purifying—Air Cooling—Humidifying—Dehumidifying—Industrial Ventilation—High and Low Temperature Drying—Generator Coolers—Dust Removal—Reclamation.

Webster Air Washers

LAFAYETTE BLDG.
PHILADELPHIA

The Wright Air Trap



Removes Air From Water Under Pressure

The Wright Air Trap is designed for removing air from water under pressure.

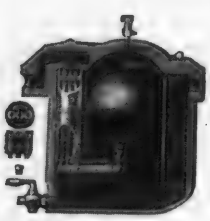
It has large capacity, is positive in action and simple in construction.

The Wright Trap is giving most satisfactory service in connection with hot water heating systems and when placed in street manholes requires no attention whatever.

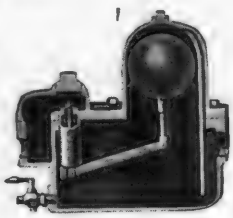
Among a variety of services to which it is adapted is the discharge of air from closed water receivers.

Standard with STEAM USERS SINCE '94

WRIGHT-AUSTIN COMPANY
Detroit, Mich.



WRIGHT "EMERGENCY" TRAP



WRIGHT "VICTOR" TRAP

technical engineers who have had professional and business experience. The principal need just now is for chemical engineers and mechanical draftsmen and designers. The employment service, which is engaged in registering available technical men, is operated principally in Washington, but has offices in many of the large cities.

Review of Business Conditions by Chamber of Commerce.

In a report reviewing general business conditions the Committee on Statistics and Standard of the Chamber of Commerce of the United States, points out that though manufacturing plants are fully employed great difficulty is experienced in obtaining sufficient cars, labor and materials. Reduction of styles in manufactured products, it is set forth, has been welcomed by manufacturers as well as by merchants as a necessary conservation of manpower and materials.

"The general belief," the report sets forth, "inclines to the conviction that business will continue much as now during the war with possible occupation of still higher prices, of less buying of luxuries and of greater economy in some directions."

Why You Should Save Paper.

Sulphur is used in the manufacture of practically all kinds of paper.

It is used in the form of SO_2, or Sulphur Dioxide.

Our Government needs great quantities of sulphur for war munitions.

Much of this is used in the manufacture of gas to be used in warfare.

Germany began the use of poison gas in warfare.

It is necessary to fight back with the same weapon.

Otherwise our soldiers will be needlessly sacrificed.

Our Government has beaten Germany at her own game.

We make a better gas, one that is deadlier and drives back the enemy more efficiently than any gas they have.

There must be no shortage of sulphur because every pound of it made into gas saves our own men and helps speed up our final victory.

Every piece of paper contains a certain amount of sulphur.

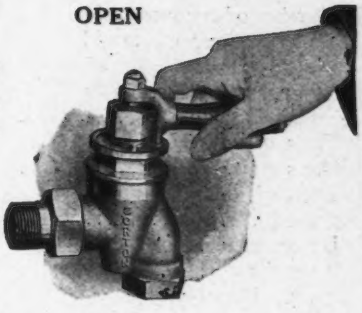
There are only two sulphur mines in America.

There is not enough sulphur for both the great quantities of gas needed and the tons of paper that we thoughtlessly waste.

GORTON QUICK OPENING VALVE

CLOSE

OPEN

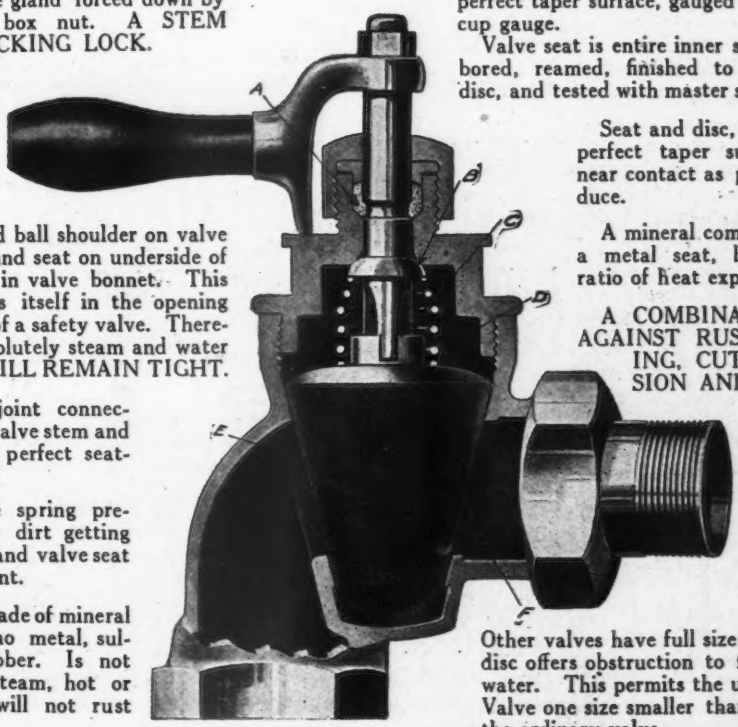


Would you use a door knob that required five or six turns of the wrist to open a door?

Then why use a valve that requires nine or ten turns of the wrist to operate?

A Quarter Turn of Handle Opens or Closes the Gorton Valve

A. Groove in valve stem fitted with soft but firm packing rings; rings forced and locked into the groove by the gland forced down by the packing box nut. A STEM WITH A PACKING LOCK.



B. Ground ball shoulder on valve stem and ground seat on underside of stem opening in valve bonnet. This shoulder seats itself in the opening like the seat of a safety valve. Therefore it is absolutely steam and water tight, AND WILL REMAIN TIGHT.

C. Loose joint connection between valve stem and disc—insuring perfect seating of disc.

D. Bronze spring prevents grit or dirt getting between disc and valve seat during shipment.

E. Disc made of mineral composition, no metal, sulphur nor rubber. Is not affected by steam, hot or cold water; will not rust nor corrode.

Cast in a master steel mould, compressed under heavy hydrostatic pressure, machine ground to a perfect taper surface, gauged by master steel cup gauge.

Valve seat is entire inner surface of valve, bored, reamed, finished to same taper as disc, and tested with master steel plug gauge.

Seat and disc, both ground to perfect taper surface, give as near contact as possible to produce.

A mineral composition disc on a metal seat, both with same ratio of heat expansion.

A COMBINATION PROOF AGAINST RUSTING, WEDGING, CUTTING, ABRASION AND LEAKING.

F. Full pipe size unobstructed horizontal passage through disc. Steam or water passes through valve without coming into contact with valve seat. Other valves have full size opening but the disc offers obstruction to flow of steam or water. This permits the use of a Gorton Valve one size smaller than required with the ordinary valve.

Radiator and Straightway with and without Union

See Sweet's Architectural Catalog, page 1365, for Specification—Write for Catalogs.

GORTON & LIDGERWOOD CO., 100 Liberty St., NEW YORK, N. Y.

War's Effect on Furnace Industry.

In order to obtain needed information for the benefit of its war service committee in dealing with the War Industries Board, the National Warm Air Heating and Ventilating Association has sent out a questionnaire to its members asking the following questions:

	1915	1916	1917
1. Number of furnaces sold (The figures should include total of all types, pipeless, room heaters, etc.)	....	....	....
2. Tons of coke used	....	....	....
3. Tons of coal used	....	....	....
4. Tons of galvanized iron used	....	....	....

5. Do you now make your own power or purchase the same?.....
   (A) How many H. P. generated by you per annum?.....
   (B) How many kilowatt hours purchased per annum?.....
6. What percentage of scrap (including your remelt) are you charging?..... (use last 30-day period).
7. To what extent can this scrap mixture be increased? .....
8. Do you now use any iron over 4 per cent in silicon content?.....
   (A) If so, what per cent of silicon content? .....
   (B) What per cent of total charge?...
9. How many salesmen did you employ selling furnaces in 1917?.....
10. How many salesmen selling furnaces are now employed?.....
11. How many of the above are now engaged by you in soliciting business?....
12. How many of the above are now employed by you in other capacities?....

(Signed) .....
Date .....

In a letter accompanying the questionnaire, it is stated that signed by Edward Morris, chairman of the association's war service committee, it is stated that he obtained the following impressions at a recent hearing before the War Industries Board:

1. Our industry will be regarded as essential to a certain point, and beyond that, unnecessary.

2. There seems to be no possibility of any non-war industry obtaining anything like its full quota of raw materials. The pig iron situation is said to be worse rather than better.

If You Have Not a Set of Our Catalogs, Get It Today

It is more than a catalog—it is a text book on Instruments for Indicating and Reading Pressure, Vacuum Draft, Temperature, etc.

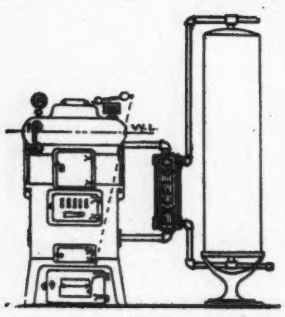
Write for Special Catalog Set HV Today

The Schaeffer & Budenberg Mfg. Co.
BROOKLYN, N. Y.

Chicago Pittsburgh Washington
St. Louis Philadelphia Los Angeles

Also many other Allied Instruments, Gauge Boards and Complete Equipment

YOUR DOMESTIC HOT WATER PROBLEM SOLVED



The Excelso Water Heater can be easily connected below the water-line of any new or old steam or vapor boiler and will furnish domestic hot water CONSTANTLY DAY AND NIGHT.

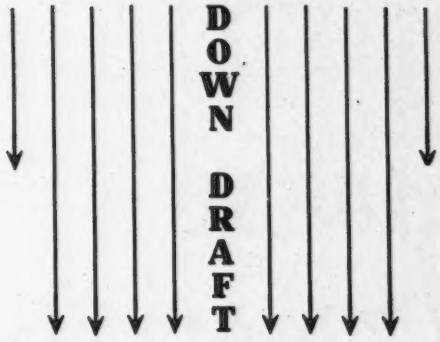
The Excelso method is approved by all Boiler Manufacturers as being the only successful way of doing away with the old-fashioned, troublesome fire-pot Pipe Coil.

Write for Booklet

EXCELSO SPECIALTY WORKS
1377 Main Street Buffalo, N. Y,

IMICO
Heating Boilers

Smokeless



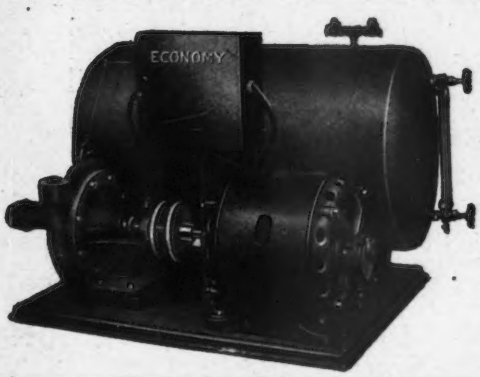
For Water or Steam

Our Catalogue describing our complete line of Heating Apparatus sent on request

ILLINOIS MALLEABLE IRON CO., Chicago

Drains Condensation from Heating Mains, Systems, etc., and pumps it to any point of use or will feed it direct into boilers under pressure. To save the heat units in your condensation saves your coal. Send for catalogue showing 12 styles of machines and 25 systems showing how we do it.

FARNSWORTH COMPANY
Conshohocken, Penna.



Automatic Electric Condensation Pump and Receiver

The Best Pump for the Least Money

Automatically returns condensation from heating systems direct to boiler. Radiators on level with boiler room floor drained perfectly. Trapped connections in old systems kept absolutely free. Get results and save 25% in fuel and labor by using the Economy Condensation Pump. It will lift water from connections trapped as much as twelve inches, when so ordered.

We make all sizes of Return and Air Line Vacuum Pumps, Bilge or Sump Pumps, also Hot Water Circulating Pumps.

Write for "ECONOMY MANUAL A." Most complete Vest Pocket Heating, Ventilating Engineer's Hand Book. This $1.00 publication mailed free on request.

ECONOMY PUMPING MACHINERY CO.
116-118 No. Carpenter St., Chicago

3. The chairman of the Priorities Board advises manufacturers of non-war products, both from the standpoint of patriotism and self-interest, to cease "pushing" their business; to sell heaters only where they are essential; to have old heaters repaired and used wherever possible; to take salesmen off the road and utilize them in other positions.

4. It is quite likely that we shall be asked to give a pledge that we will sell furnaces only in essential cases, and our customers, in turn, asked to give a similar pledge to us.

WANTED.

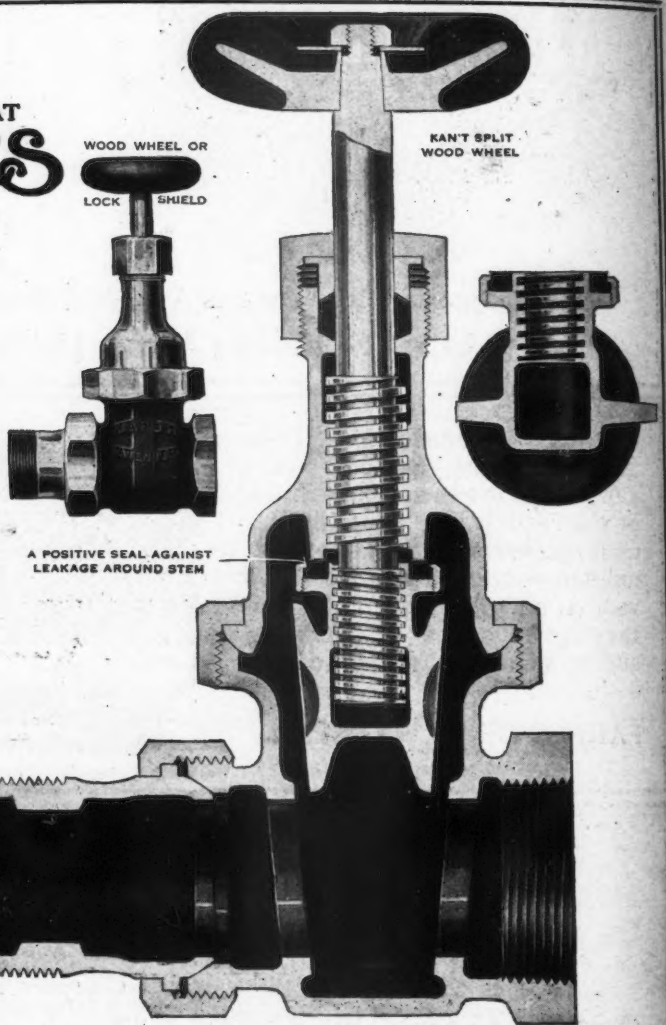
Wanted—Men to sell radiators, boilers and other heating goods on commission basis in Eastern Pennsylvania, Ohio, Maryland and West Virginia. Address A-3, care of HEATING AND VENTILATING MAGAZINE.

FOR SALE.

Machinery For Sale.—One Borden hand pipe-threading machine. Will thread up to 4 in. Address Box 23, care of HEATING AND VENTILATING MAGAZINE.

MARSH

UNION BONNET
DOUBLE SEAT
VALVES



PLEASE NOTE UPPER SEAT and QUICK OPENING features DISTINCTIVE with THIS line.

These valves will open with ONE-HALF the number of turns of an ordinary valve and WILL NOT LEAK around the stem.

Also note "Kant-Split" wheel.

FURTHER: NOTE THIS IS NOT A SOLID WEDGE, BUT PIVOTED DOUBLE-DISC GATES, having SUFFICIENT FLEXIBILITY for SELF-ADJUSTMENT, TO TAKE CARE OF ANY WEAR OR IRREGULARITY IN MACHINING.

Both Mill Supply, Iron Wheel, Screwed End, and Radiator, Wood Wheel with Unions, 150 pound pressure.

Let us send you catalogue and discounts

MARSH VALVE COMPANY
Erie, Pa.